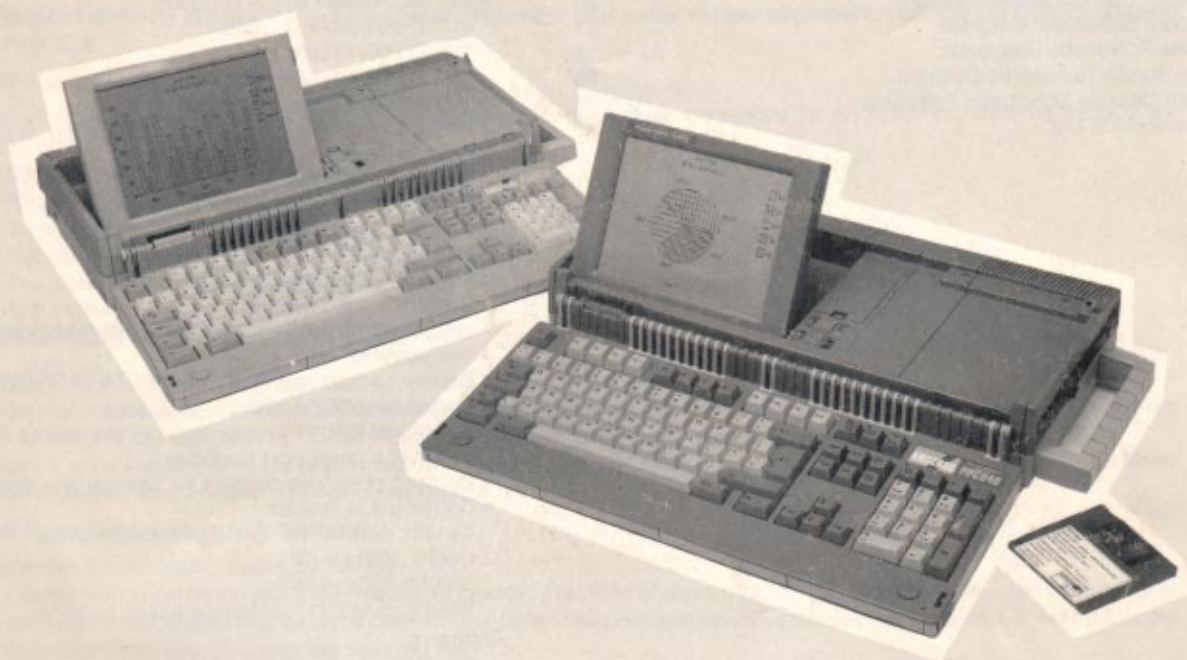


AMSTRAD



<http://amstrad.cpc.free.fr>

PPC 512S / 512D

PPC 640S / 640D

**PERSONAL
PORTABLE COMPUTER**

SERVICE MANUAL

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TECHNICAL SPECIFICATION

PPC640

- Parallel Centronics Printer Port
- Compartment for 10 Alkaline C Cells to give up to 8 hours use.
- 8086 16-bit processor, 8MHz clock.
- 640k Ram, 64k Video Memory.
- Integrated display adaptor fully compatible with MDA and CGA. Drive either the LCD panel or an external monitor.
- 640 x 200 pixel supertwist LCD panel supports all CGA and MDA graphics and text modes. Display can be tilted to 6 viewing angles and contrast is fully adjustable to allow for different lighting conditions.
- Integral Modem which supports V21 (300 bps) Full Duplex V23 (1200/75bps) V22 (1200 bps) Full Duplex V22bis (2400 bps) Full Duplex
- Hayes Command compatible; auto-dialling, auto answer
- Includes Serial Port.
- AC Mains Adaptor.
- Enhanced AT type keyboard with 102 keys.
- Single or Twin 720K 3½ inch Disk Drives.
- Microsoft MS-DOS 3.3 Operating System.
- Mirror II Communications Software.
- Built-in Super Twist, 640 x 200 resolution, with grey scale emulation; hardware to drive any external CGA monitor.
- Speaker with volume control.
- Battery backed real time clock with scratchpad RAM.
- Socket for 8087 maths co-processor.
- Socket for PPC640 expansion box (to accept IBM compatible expansion cards and hard disk).
- Carrying case with pockets for manual and disks.
- Carrying size closed:
Length: 450mm (17 3/4") excluding handle.
Depth: 230mm (9")
Height: 100mm (4")
Weight: 5.4Kg (11 3/4lb) excluding batteries.

PPC512

- PPC512 specification as PPC640 but with 512K Ram and without integral modem and Mirror II Communications Software.
- Single or Twin 720K 3½ inch Disk Drives.

IMPORTANT NOTES TO SERVICE ENGINEERS

This Service Manual gives indepth technical information on all of the circuits and the P.C.B.'s which make up the PPC512/640. Much of this data is for information purposes only as the procedure engineers will follow when servicing this equipment will often be to exchange Printed Circuit Boards. In some instances Amstrad will insist that subassemblies are returned for exchange and should not be serviced by Service Engineers.

Please take note of the following information before attempting to the service the equipment.

1. Full diagnostics are not specified in this manual. A diagnostic tool, designated the R.P.5-2*, is available from CPC and gives certain diagnostic information on the Computer. To carry out any indepth fault-finding this diagnostic tool is necessary.
2. The Disc Drive Mechanism and accompanying Printed Circuit Boards should not be serviced by Service Engineers. Exchange mechanisms complete with P.C.B.'s are available from Amstrad.
3. LCD Supertwist is a complete unit, and no service should be attempted on this unit by the field engineers. Exchange Display Assembly should be obtained from Service Department.
4. Complete Printed Circuit Boards are available on an exchange basis and unless the Service Engineer is particularly familiar with this product arrangements should be made to exchange the P.C.B.'s where a fault has developed. The R.P.5-2 diagnostic referred to above can be used to ensure correct diagnosis of the P.C.B. fault.
5. In some instances a second Disc Drive will be fitted to the PPC512/640. This second Disc Drive is subject to separte service information but under no circumstances should any service work be carried out on the mechanism or its Printed Circuit Board. In the event of a fault on the second Disc Drive arrangements should be made to exchange this.
6. Service Engineers carrying out any repairs on this unit can contact the Customer Services Section of Amstrad for further information should they have any difficulty.

The PPC512/640 is a sophisticated piece of computer technology and service work should be undertaken on this equipment by suitably qualified personnel and preferably by appointed Amstrad Agents.

*Upgrade kit is available to enable full diagnosis of the said machine.

FD-5 MAINTENANCE AND ALIGNMENT INFORMATION (FOR INFORMATION PURPOSES ONLY)

1. OUTLINE OF MAINTENANCE

- The following tools are required for maintenance of a Floppy Disk Drive

1.1 Alignment Diskette

Alignment diskette is used for head actuator alignment and index sensor alignment. Use the JU-01AA - DD and 817-363CE.

1.2 Exerciser

The exerciser enables you to make all adjustments and inspections necessary for an FDD. Its functions include the following:

- (1) Seek increment or alternate tracks
- (2) Read (but no data compare)
- (3) Write 1F or 2F (All 0's or 1's)
- (4) Recalibration to track 00

The exerciser has switches and indicators to execute a specified function.

2. DIAGNOSTIC PROCEDURES

2.1 Error Symptom Recognition

Errors that occur because of the wrong operating procedure, wrong programming, or use of a defective diskette, or soft errors due to external causes, such as contaminated air and random electrical noise, are often attributed to a drive failure.

Unless a visual inspection of the drive reveals an evident assembly fault or a defect, **always confirm errors with another good diskette, and another known good drive.**

2.2 Soft Error Detection and Correction

Soft errors are normally caused by the following:

- (1) Contamination between read/write heads and diskette. **This kind of contamination can be easily eliminated by the liner in the diskette.** Contaminated heads can be cleaned by a general purpose non-abrasive head cleaning diskette. Please follow the suitable procedure provided with the cleaning diskette.
- (2) Random electrical noise, normally a few microseconds or less.
- (3) Small defects in written data and/or track not detected during write operation may cause soft errors during read.
- (4) Faulty grounding of the drive or host system can also cause a soft error.
- (5) Wrong motor speed is another cause of soft errors.

Take the following steps on the controller side to recover from the soft errors mentioned above.

- (1) Read the track again ten times or until the data is recovered.
- (2) If Step (1) above fails to recover the data, access the adjacent track. Then return the head to the original track.
- (3) Repeat Step (1).
- (4) Any error that cannot be corrected by the above procedure is irrecoverable.

2.3 Write Error

If an error occurs during write operation, it is usually detected during the next revolution by performing a read operation called write check. To correct an error, write again and repeat a write check operation. If the result is unsatisfactory after ten or more write operations, perform a read operation on another track to determine whether it is the diskette or the drive that is wrong. If an error persists, replace the diskette and repeat the above procedure. If the error still persists, consider the drive defective. If the error is corrected, dispose of the diskette as defective.

2.4 Read Error

Most read errors are soft errors. Data can be recovered by following the recovery procedure mentioned in 2.2.

2.5 Seek Error

- (1) Stepper motor or stepper motor circuit drive is faulty.
- (2) Faulty Carriage

There are two ways of seek error recovery. One is to recalibrate to track 00, and seek back to the original track. The other is to read the ID field, check the track number on which the head is located, and move the head away from it. And read it again.

2.6 Interchangeability Error

Data which is written by one drive may not be read by another. This error is called an Interchangeability error, which can be caused mostly by the following reason, which should be checked as follows.

- (1) Head misalignment: Refer to Adjustments and Confirmation Item 5.5
- (2) Head output too low: Refer to Adjustments and Confirmation Item 5.3
- (3) Motor speed difference: Refer to Adjustments and Confirmation Item 5.1
- (4) Format difference

3. TROUBLE ANALYSIS

3.1 Trouble Analysis Procedure

FDD trouble may occur in any of the following nine forms.

- (1) Index detection failure
- (2) Not ready
- (3) Track 0 undetectable
- (4) No seek
- (5) No write
- (6) No read
- (7) Read error
- (8) IN USE LED won't light
- (9) Write protect undetectable

CAUTION:

Be sure to switch power off before removing an FDD or PCB from the operating system.

3.1 TROUBLE ANALYSIS TABLE

| Item | Trouble | No. | Cause | JU-3X2, 252A, 253A |
|------|---------------------------|-----|--------------------------------------|---------------------------|
| 1 | Index Detection Failure | 1 | DD motor control PCB | Replace DD motor assembly |
| | | 2 | DD motor faulty | Replace DD motor assembly |
| | | 3 | Index LED faulty | Replace |
| | | 4 | Index detector faulty | Replace |
| | | 5 | PCB motor ON circuit | Repair |
| | | 6 | PCB index detection circuit | Repair |
| 2 | Not ready | 1 | See Item 1 | |
| | | 2 | PCB ready circuit | Repair |
| 3 | Track 0 detection failure | 1 | Track 00 assembly | Replace |
| | | 2 | PCB track 0 detection failure | Repair |
| 4 | No seek | 1 | Stepper motor | Replace |
| | | 2 | Guide shaft contamination or damaged | Replace |
| | | 3 | PCB stepper driver circuit | Repair |
| 5 | No WRITE | 1 | See Item 1 | |
| | | 2 | Head disconnected | Replace |
| | | 3 | Head shorted | Replace |
| | | 4 | PCB write circuit | Repair |
| 6 | No READ | 1 | See Item 1 | |
| | | 2 | See Item 5 | |
| | | 3 | PCB read circuit | Repair |
| 7 | READ ERROR | 1 | See Item 1 | |
| | | 2 | See Item 6 | |
| | | 3 | Alignment | Adjust |
| | | 4 | Azimuth | Unadjustable |
| | | 5 | Burst | Unadjustable |
| | | 6 | Asymmetry | |
| | | 7 | Limiter | Adjust |
| | | 8 | Flag 0 | Adjust |
| | | 9 | Index period | Replace DD motor assembly |
| | | 10 | PCB read circuit | Repair |
| 8 | IN USE LED won't light | 1 | LED part | Replace |
| | | 2 | PCB IN USE circuit | Repair |
| 9 | Write protect failure | 1 | Write protect part | Replace |
| | | 2 | Write protect circuit | Repair |

4. PREVENTIVE MAINTENANCE

No preventive maintenance is necessary for any type of FDDs under normal conditions of use. However if it is determined that adjustments are necessary, the following must be done.

• Adjustments (Refer to table 4.1)

- (1) Specify an applicable model from Table 4.1, and make a read/write head radial adjustment at a specified track. (Sides 0,1)
- (2) Make an index timing adjustment at a specified track. (Sides 0,1).
- (3) Make an azimuth measurement at a specified track (Sides 0,1)

CAUTION

Do not write when using alignment diskette. Check that write protect sensor is properly operating with a data diskette. Note: Section 9 describes the adjustment procedures in detail.

5. ADJUSTMENTS AND VERIFICATIONS

5.1 Motor Speed Verification (Index Period)

- (1) Insert a diskette, run the motor, and clamp. Refer to the index period column of Table 4.1 for the applicable model.
- (2) Step to the specified track.
- (3) Connect a frequency counter to the INDEX signal. IX (INDEX)
- (4) Check that the frequency counter readings meet the specifications in the table.

5.2 Write Protect Verification

- (1) Check that the exerciser's write protect lamp goes on and off as a media is inserted and removed as specified in the table below.

Media with write protect hole open: ON
Media with write protect hole closed: OFF

5.3 Head Output Verification

Use a new diskette if possible to identify head failure for this check.

- (1) Insert a good diskette.
- (2) Run the motor.
- (3) Step to the track specified in the output level column of Table 4.1.
- (4) Connect the oscilloscope probe as specified below.

CH1 : T1
CH2 : T2
EXT : IX (Index)

Invert channel 2 and select the Add mode.

Set vertical deflection to 10mV/division and horizontal deflection to 20ms/division.

- (5) Write 2F (all ones) on the entire circumference.
- (6) Check that the average output level meets the specifications of Table 4.1. If it does not meet the specifications, refer to item 7 of the Trouble Analysis Table.

5.4 Output Modulation Verification

Modulation: M is calculated by the following formula.

$M(\%) = \frac{V_{max} - V_{min}}{V_{max} + V_{min}} \times 100$ using the value obtained in 5.3, and check that the calculated value is 20% or less.

$M(\%) = \frac{V_{max} - V_{min}}{V_{max} + V_{min}} \times 100$

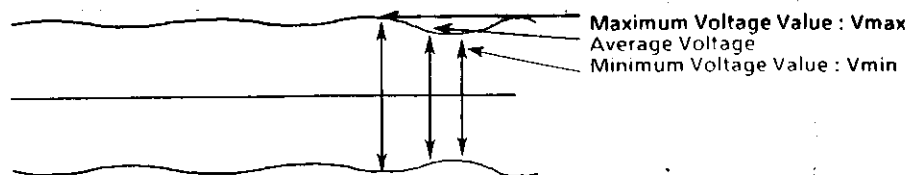
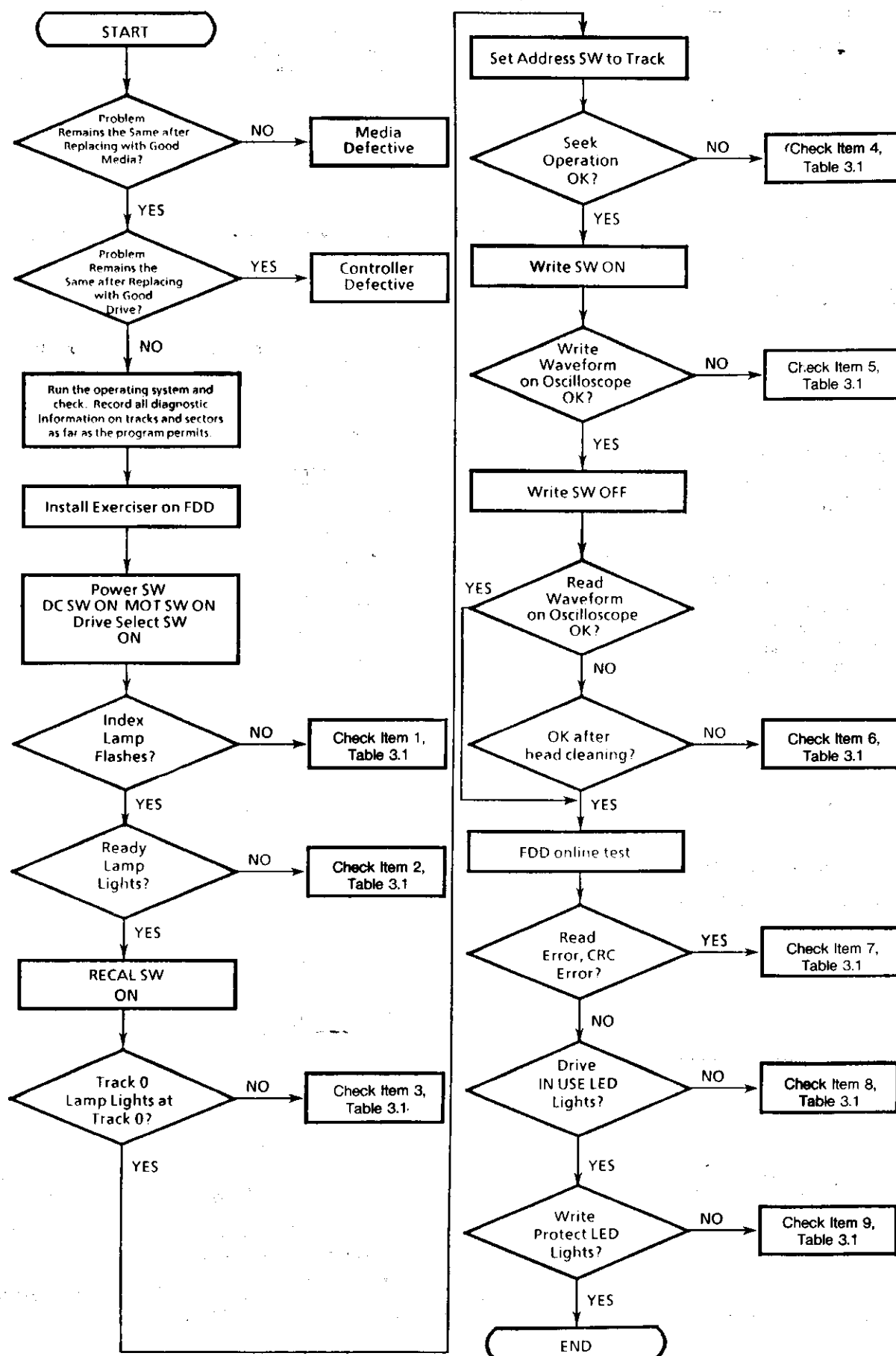


Fig. 5.1 Modulation

3.2 Trouble Shooting Flow Chart



5.5 Radial Alignment Adjustment

Introduction

This adjustment is normally not necessary.

If the mounting screws for the stepper motor loosen, or if parts become defective, or if a compatibility error occurs, check and readjust according to the following procedure.

Steps (4) and (9) below should be performed regardless of the type, CE or DAD alignment diskette used. Use an alignment diskette suitable to the type of FDD to be adjusted according to table.

- (1) Insert an alignment diskette.

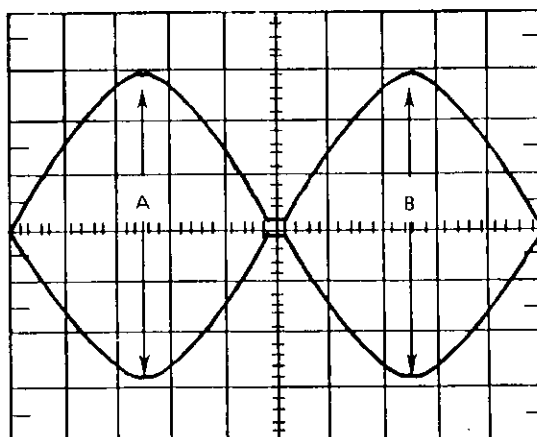
CAUTION:

Be sure to leave the alignment diskette under room conditions for 20 minutes before adjustment.

- (2) Step to the track specified in the Radial alignment column of Table 4.1.
- (3) Leave the oscilloscope in the same condition as mentioned in section 5.3.

Cats Eye System

- (4) Check the output waveforms for sides 0 and 1. They should appear as in Fig. 5.2.
- (5) The two waveforms should appear in the amplitude ratio in the R/A $\pm 42\%$ or more.
- (6) If the specified ratio is not satisfied, loosen the two mounting screws for the stepper motor.
- (7) Move the stepper motor along the base by hand until the two waveforms assume approximately the same amplitude, and retighten the mounting screws. (See Fig. 5.2).
- (8) Step the head outward (track 0) and inward (track 40 or 79), and confirm that the adjustment has been completed.
- (9) After the initial adjustment, be sure to confirm track 00 sensor adjustment 5.8 and carriage limiter 5.9.



$$A > B : \frac{B}{A} \times 100$$

$$B > A : \frac{A}{B} \times 100$$

Fig. 5.2 Radial Alignment Waveforms (CATS EYE)

Note: Alignments on sides 0 and 1 are adjusted at the factory. If they are misaligned, adjust them to meet the specifications of Table .

DAD (Dynamic Alignment Diskette)

- (4) Watch the output waveforms for sides 0 and 1. They should appear as shown in Fig. 5.3.
- (5) Measure the timing levels A1 to A4 and B1 to B4 in Fig. 5.3., and calculate the lobe ratio from the following formulas.

$$\Sigma A > \Sigma B : \frac{\Sigma B}{\Sigma A} \times 100\%$$

$$\Sigma A < \Sigma B : \frac{\Sigma A}{\Sigma B} \times 100\%$$

- (6) The lobe ratio calculated by the above formulas should meet the specifications on item 3 of Table.
- (7) If the above requirement is not met, loosen the two mounting screws for the stepper motor, adjust.
- (8) Seek from track 0 to track 40 and from track 79 to track 40, and confirm that the adjustment has been completed.
- (9) After the radial adjustment, be sure to confirm track 00 sensor adjustment 5.8 and head carriage limiter 5.9.

Note: An alignment instrument for 3.5 inch FDDs permits accurate and easy adjustment because the lobe ratio is displayed on the instrument.

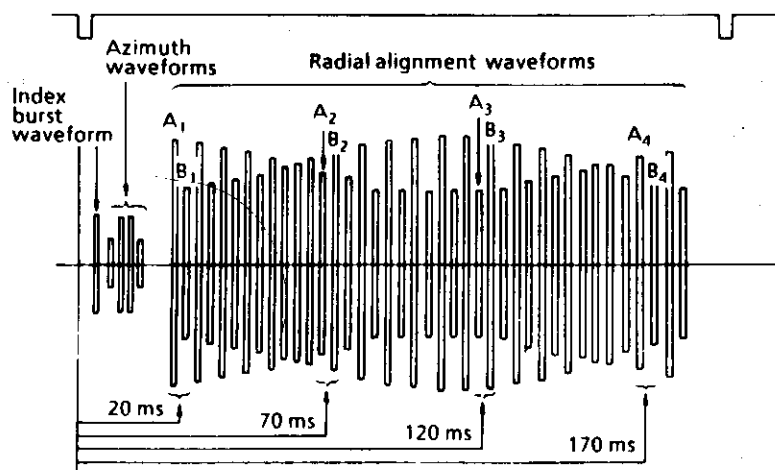


Fig. 5.3 Alignment Waveform (DAD)

5.6 Azimuth Verification

- (1) Insert an alignment diskette. Seek to the track specified in the azimuth column of Table 4.1.
- (2) Set the oscilloscope in the same conditions as in 5.3., and set horizontal deflection to 2ms/div (DAD) or 0.5 ms/div (CE).
- (3) Measure as shown below.
- (4) Confirm that the measured value meets the specifications in the azimuth column of Table 4.1.

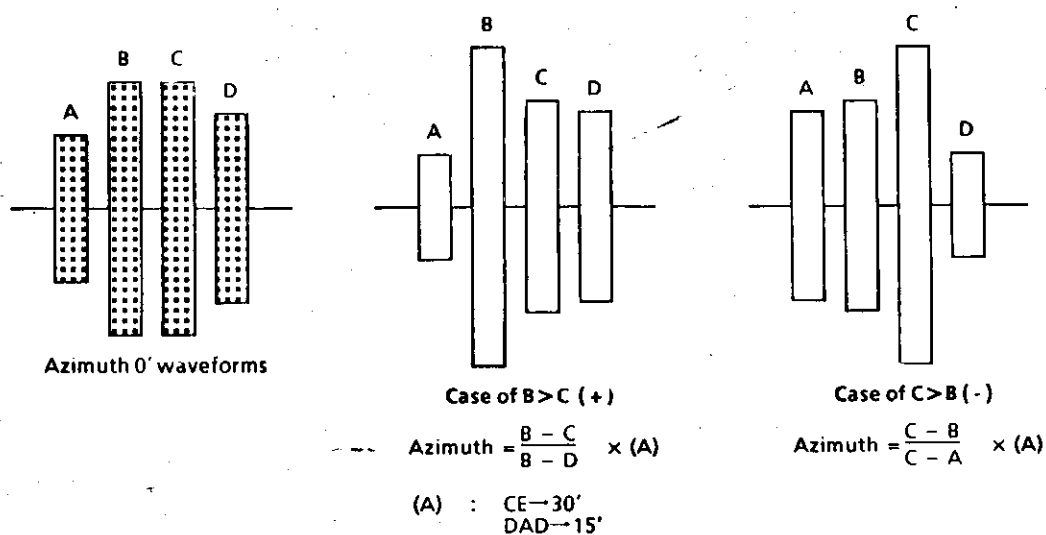


Fig. 5.4 Azimuth Waveforms

5.7 Index Burst Verification and Adjustment

- (1) Insert an alignment diskette. Seek to the track specified in the I/B column of Table 4.1.
- (2) Set the oscilloscope time base as follows: 1ms/division.
- (3) Check that the time from oscilloscope start to the first data pulse meets the I/B specifications of Table 4.1. (DAD SYSTEM).

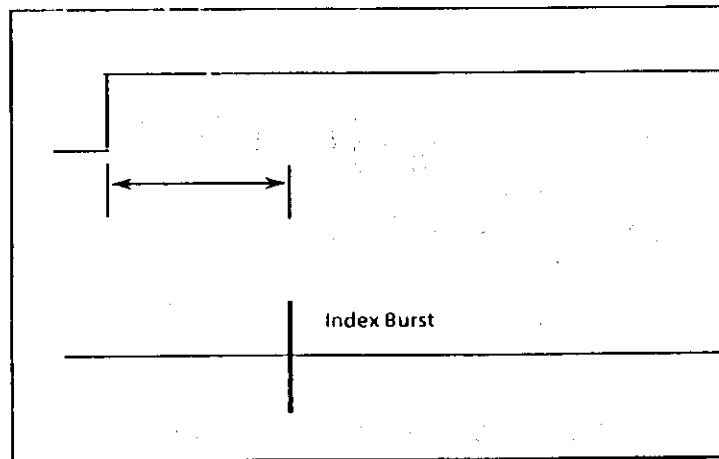


Fig. 5.5 Index Timing

5.8 Track 00 Sensor Adjustment

(1) Set the oscilloscope as follows:
Set horizontal deflection to 1ms/division.

CH1 : ZP

EXT : SP

(2) Step between specified tracks at in the FLAG 0 item of Table 4.1. (Turn the seek delay switch on the exerciser to adjust 12ms seek).

(3) Loosen the track 0 sensor screw and adjust until the waveform on the oscilloscope appears as shown in Fig. 5.6.

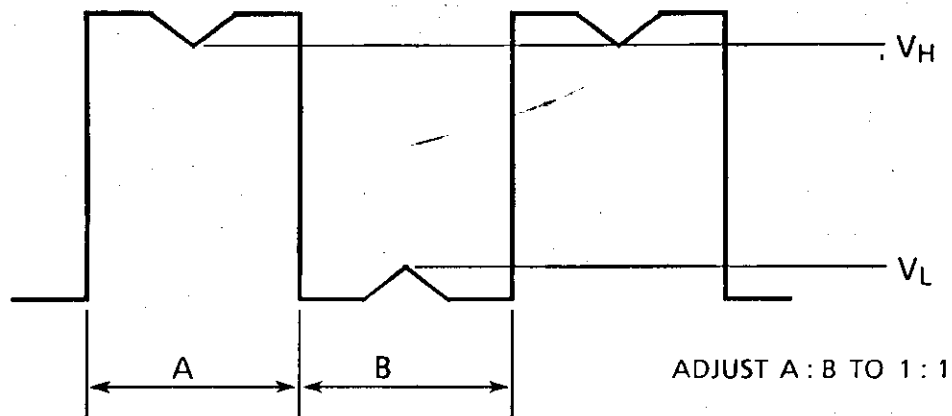


Fig. 5.6 Track 0 Waveform

5.9 Limiter Verification

- (1) Seek to track 0.
- (2) Write 2F data on track 0, and measure read level.
- (3) Seek to track -1, and check that the head just touches the limiter.
- (4) Check that, when the RECAL switch on the exerciser is pushed ON, the head returns to track 0 and that the 2F output level is the same as that measured in Step (2).

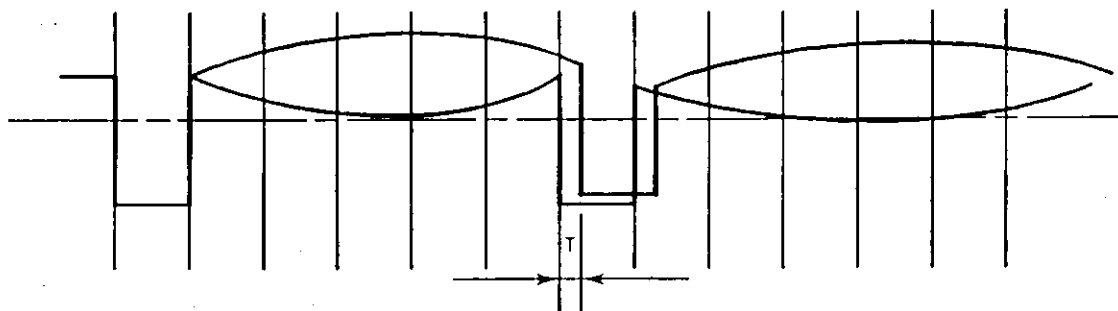


Fig. 5.7 Asymmetry Waveform

(Asymmetry Wave form might be reversed up-and-down from model to model)

5.10 Asymmetry Verification

- (1) Insert a data diskette.
- (2) Step to the track specified in the symmetry item of Table 4.1.
- (3) Set the oscilloscope as follows:

CH1 : RD

CH2 : T1

Set time base to 1 μ s/division and vertical deflection to 0.2 v/division.

- (4) Write 1F.
- (5) A read wave form is displayed on the oscilloscope as shown in Fig. 5.7.
- (6) Confirm if it satisfies the value as shown in Table 4.1.

(Asymmetry wave form might be reversed up-and-down from model to model).

ALIGNMENT CASSETTE

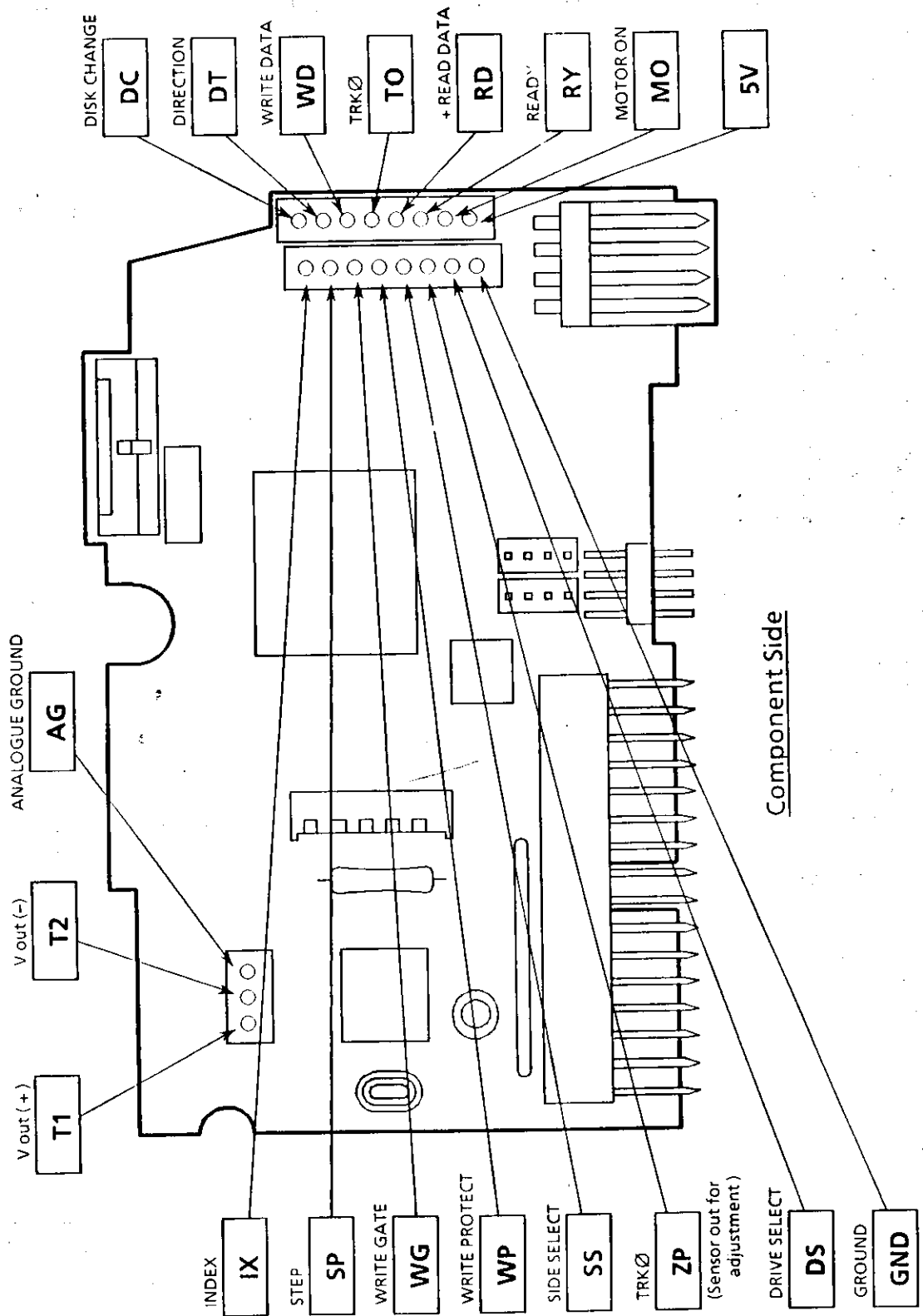
3.5 inch Alignment Diskette

| TP1 | P/N | Index Burst | Azimuth | Radial Alignment | MODEL |
|---------|-----------|-------------|---------|------------------|---------|
| 135 DAD | JU-01AA | 40TRK | 40TRK | 40TRK | JU-252A |
| 135 CE | 817-363CE | | | | JU-253A |

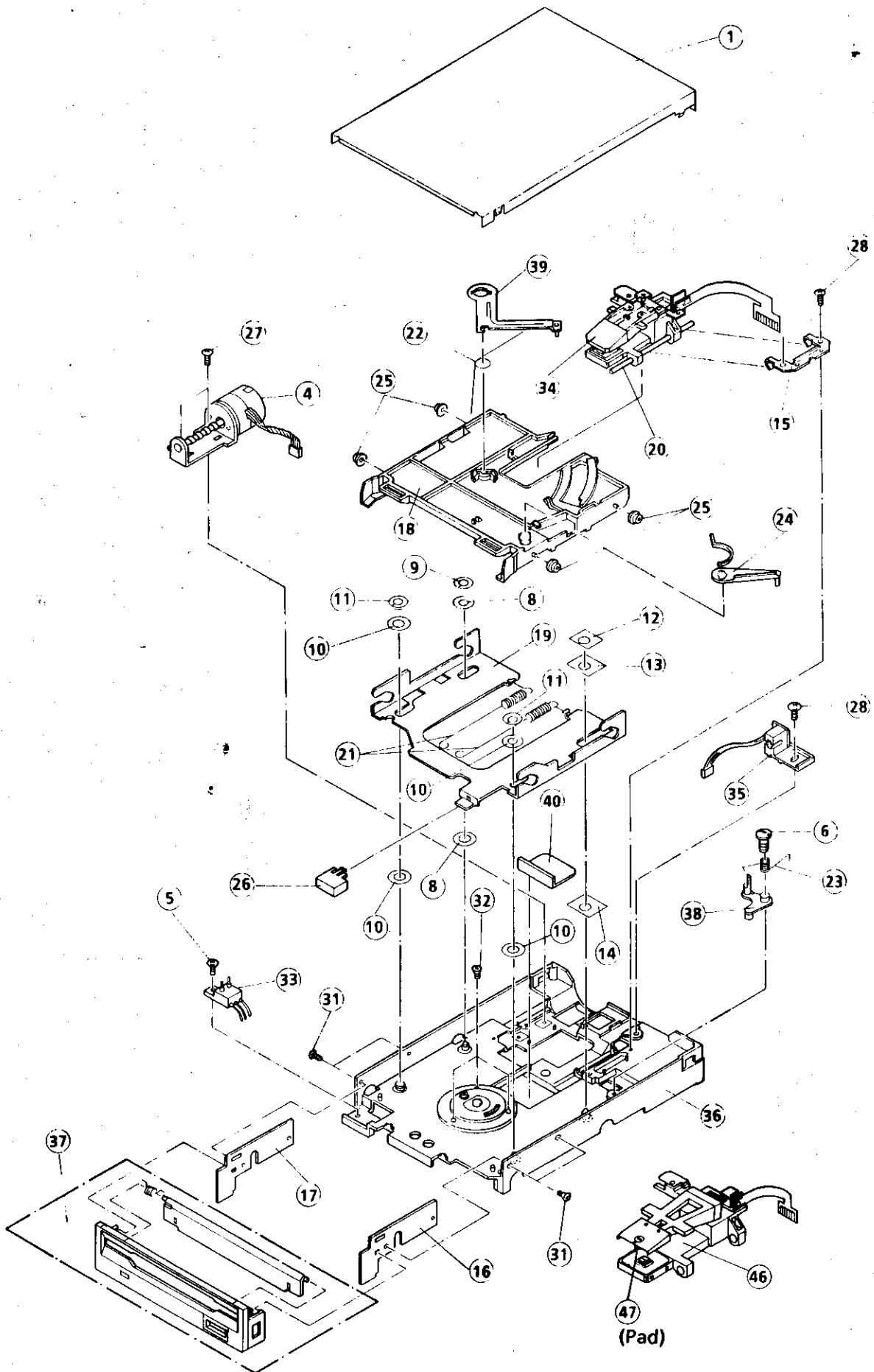
MEASUREMENT ITEMS TABLE 4.1

| Item | Parameter | JU-252A, 253A | |
|------|--|-------------------------------------|--|
| | | TRK | Value |
| 1 | Index Period | 40 | 200 \pm 2ms |
| 2 | Output Level | 79 | 80mV or more |
| 3 | Radial Alignment Reference (DAD) Reference (CE by 817-363CE) | 40 | \pm 35 μ m (29% or more) (42% or more) |
| 4 | Azimuth | 40 | \pm 24' |
| 5 | Index burst | 40 | 3 \pm 1.7ms |
| 6 | Flag 0 | From track 0 to track 1 and back | TR00 (TR00: Low, Tr1: Height) |
| 7 | Limiter | -1 | Recalibrate and return to 0 |
| 8 | Asymmetry | 79 | \leq 700NS |

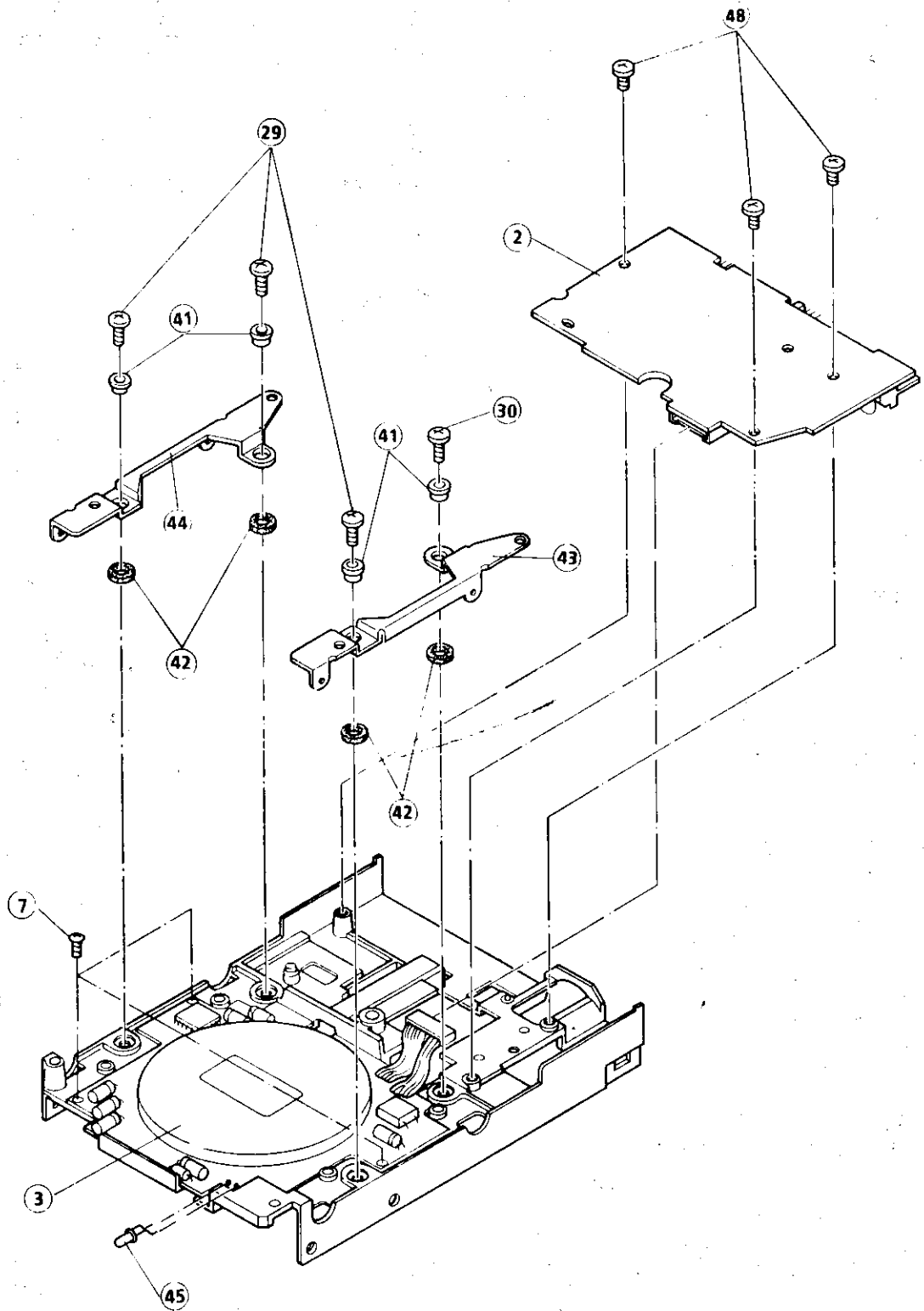
TEST POINTS



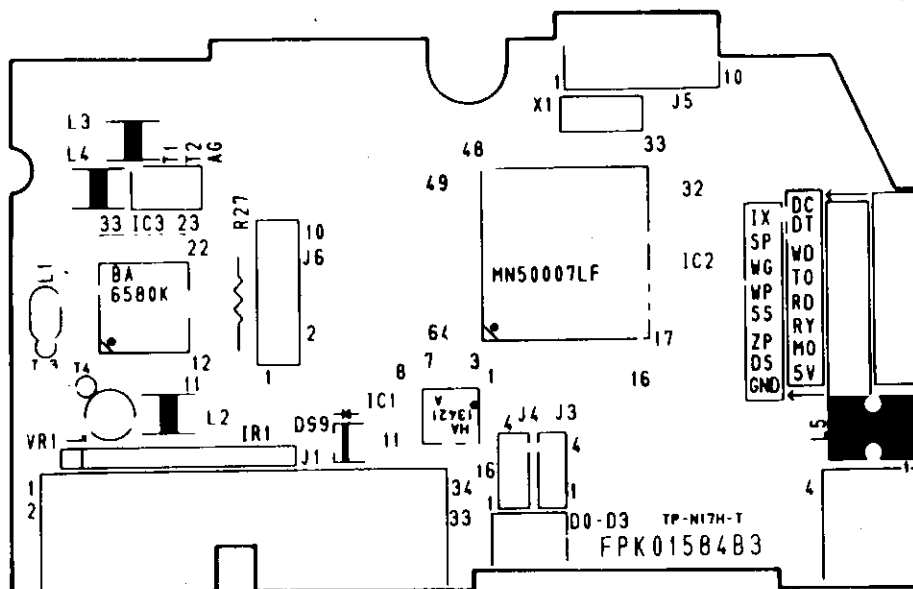
EXPLODED VIEW — 1



EXPLODED VIEW — 2



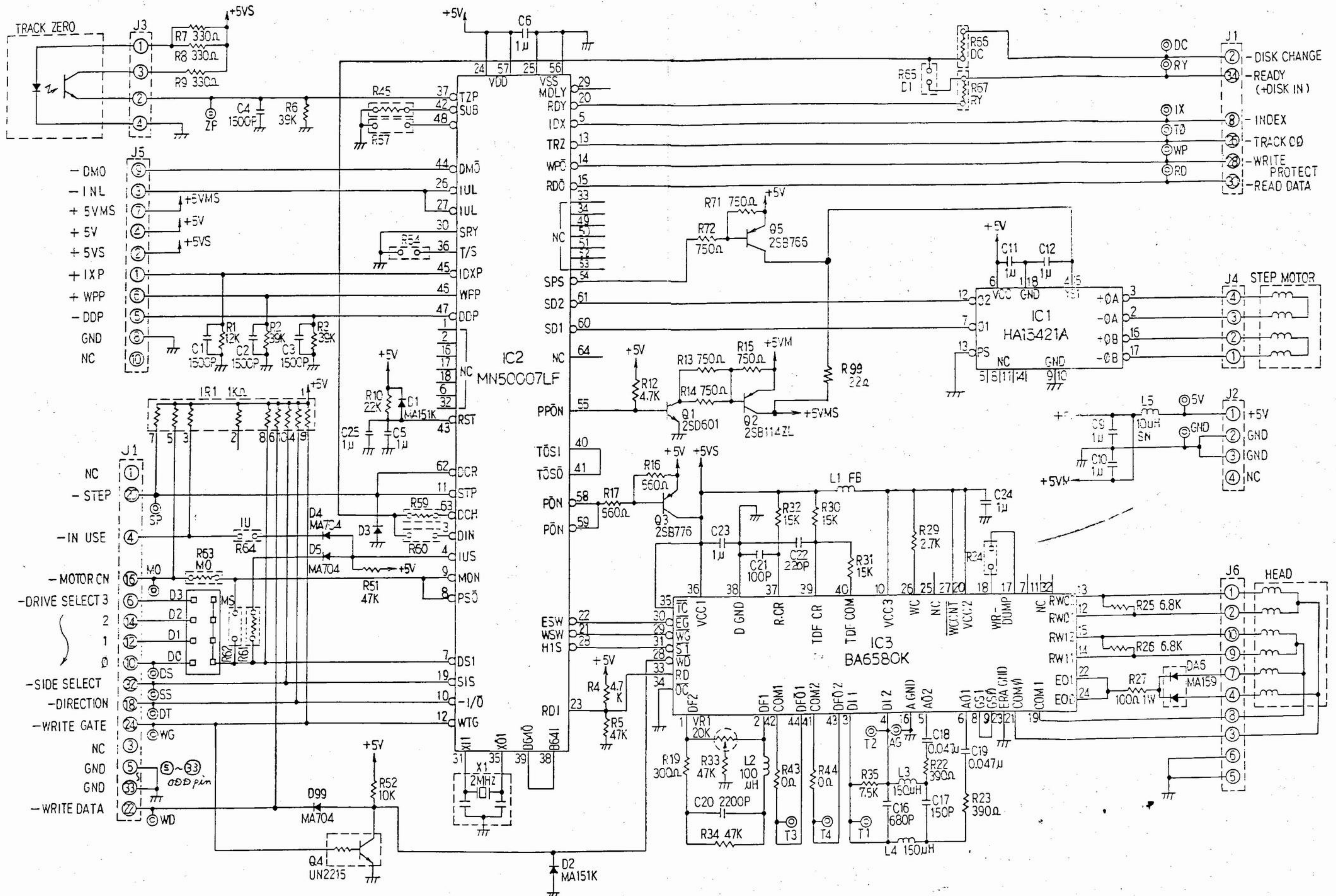
Component Side



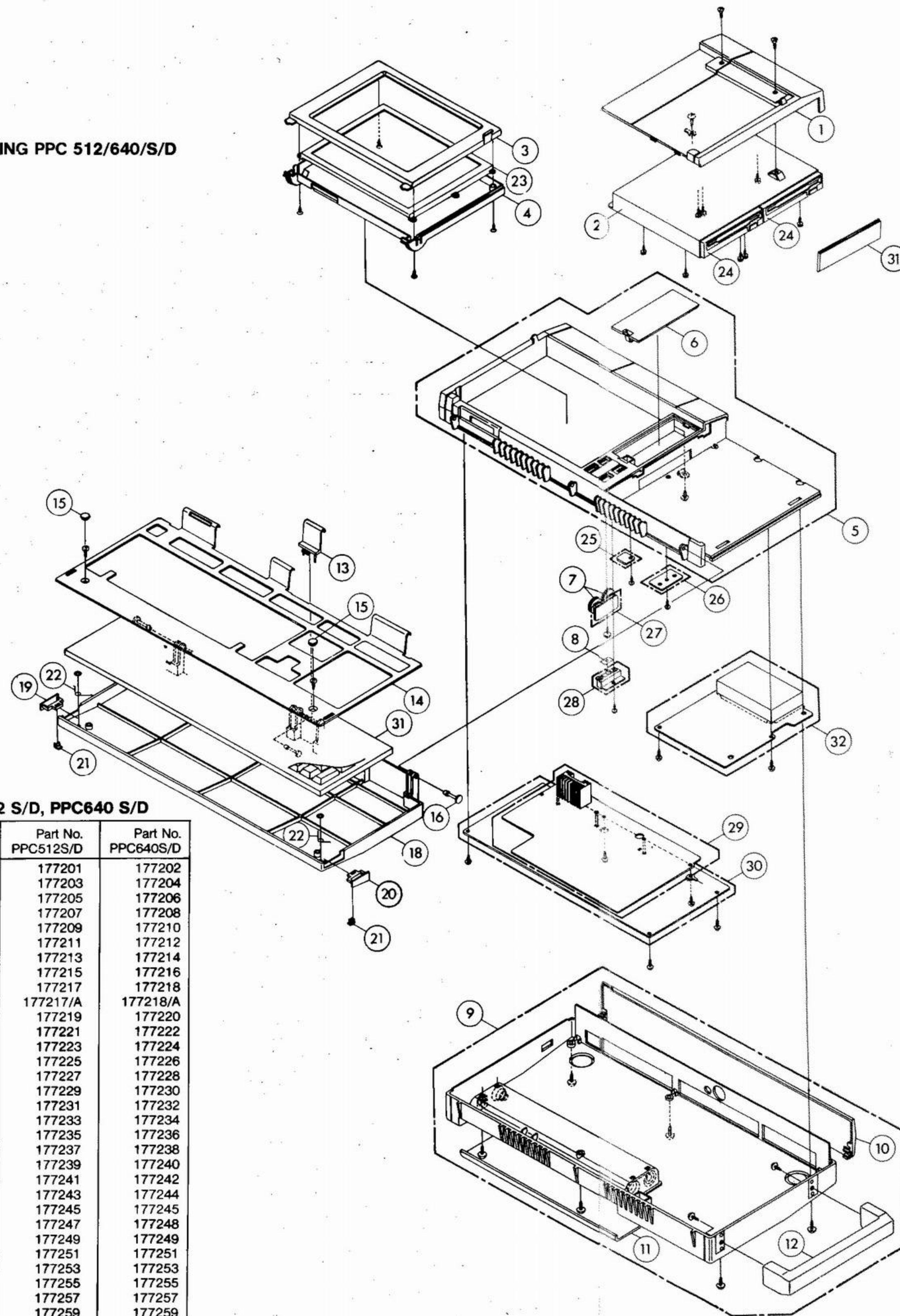
Equipment required: Digital Multimeter; D.B.O.Scope; Diagnsostic Disc/Tool.

| Step | FUNCTION | SIGNAL IN | SIGNAL OUT | METHOD | REMARKS |
|------|----------|-----------|-----------------------------------|--|--|
| 1. | Set RTC | X-103 | Connect Odometer to Pin 21 IC134. | Set Odometer to 0.2sec/Day. Adjust it to read 0.00 with TC101. | Do this adjustment only if the real timeclock ch1l is changed. |
| 2. | Set +5V. | Power On. | Junc. of L501 & C514. | Adjust VR501 to get 5V \pm 5%. | Use Power Adaptor to power PPC. |

FD-5 SCHEMATIC DIAGRAM OF CONTROL BOARD

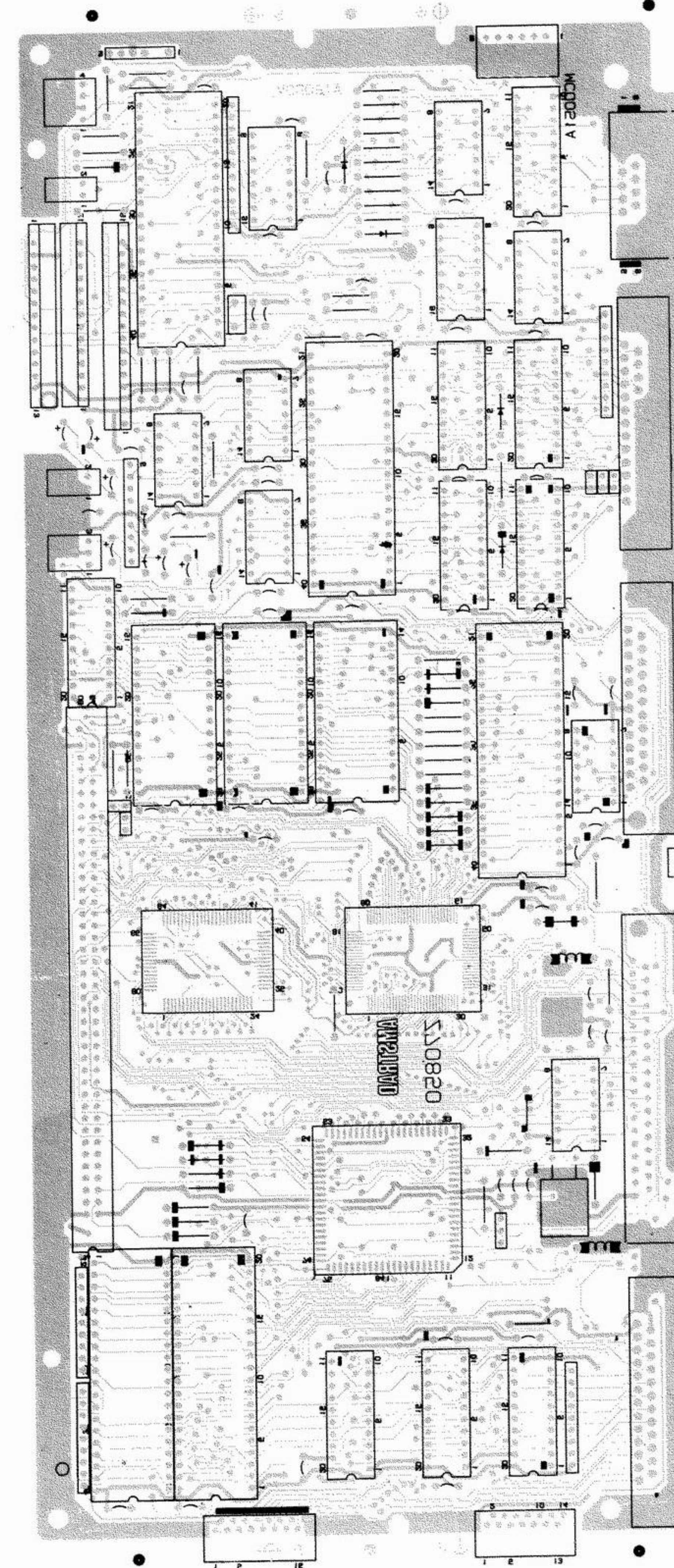


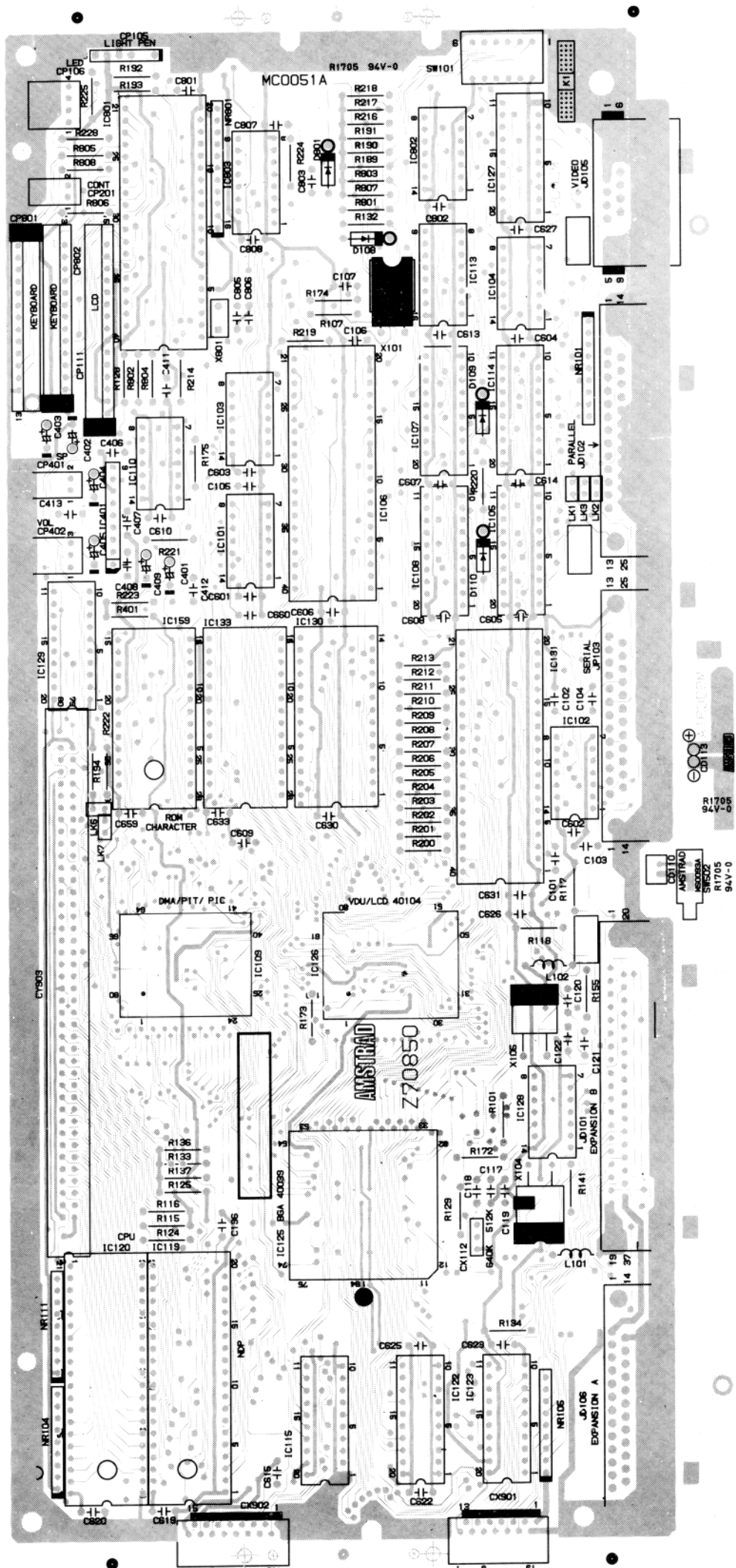
CABINET DRAWING PPC 512/640/S/D



CABINET PARTS LIST PPC512 S/D, PPC640 S/D

| Ref. | Description | Part No. PPC512S/D | Part No. PPC640S/D |
|------|-------------------------------|-----------------------|-----------------------|
| 1 | Cover FDD | 177201 | 177202 |
| 2 | Frame FDD | 177203 | 177204 |
| 3 | Cabinet Top LCD | 177205 | 177206 |
| 4 | Cabinet Bottom LCD | 177207 | 177208 |
| 5 | Cabinet Main Top Ass'y | 177209 | 177210 |
| 6 | Lid Compartment | 177211 | 177212 |
| 7 | Knob Volume | 177213 | 177214 |
| 8 | Cover Power Switch | 177215 | 177216 |
| 9 | Cabinet Main Bottom Ass'y "S" | 177217 | 177218 |
| 10 | Cabinet Main Bottom Ass'y "D" | 177217/A | 177218/A |
| 11 | Expansion Connector Door | 177219 | 177220 |
| 12 | Lid Battery | 177221 | 177222 |
| 13 | Handle | 177223 | 177224 |
| 14 | Lid Key Board | 177225 | 177226 |
| 15 | Cabinet Top Key Board | 177227 | 177228 |
| 16 | Screw Cap | 177229 | 177230 |
| 17 | Stud (A) | 177231 | 177232 |
| 18 | Stud (B) | 177233 | 177234 |
| 19 | Cabinet Bottom Key Board | 177235 | 177236 |
| 20 | Knob Slide (L) | 177237 | 177238 |
| 21 | Knob Slide (R) | 177239 | 177240 |
| 22 | Holder Slide Knob | 177241 | 177242 |
| 23 | Spring Slide Knob | 177243 | 177244 |
| 24 | Super Twist LCD Screen | 177245 | 177245 |
| 25 | FD-5 Floppy Disc Drive | 177247 | 177248 |
| 26 | PCB LED | 177249 | 177249 |
| 27 | PCB Fuse | 177251 | 177251 |
| 28 | PCB Volume/Contrast | 177253 | 177253 |
| 29 | Slide Switch Power On/Off | 177255 | 177255 |
| 30 | PCB Power Supply/Memory | 177257 | 177257 |
| 31 | PCB CPU Ass'y | 177259 | 177259 |
| 32 | Blanking Cover "S" | 177261 | 177262 |
| | PCB Modem | | 177322 |

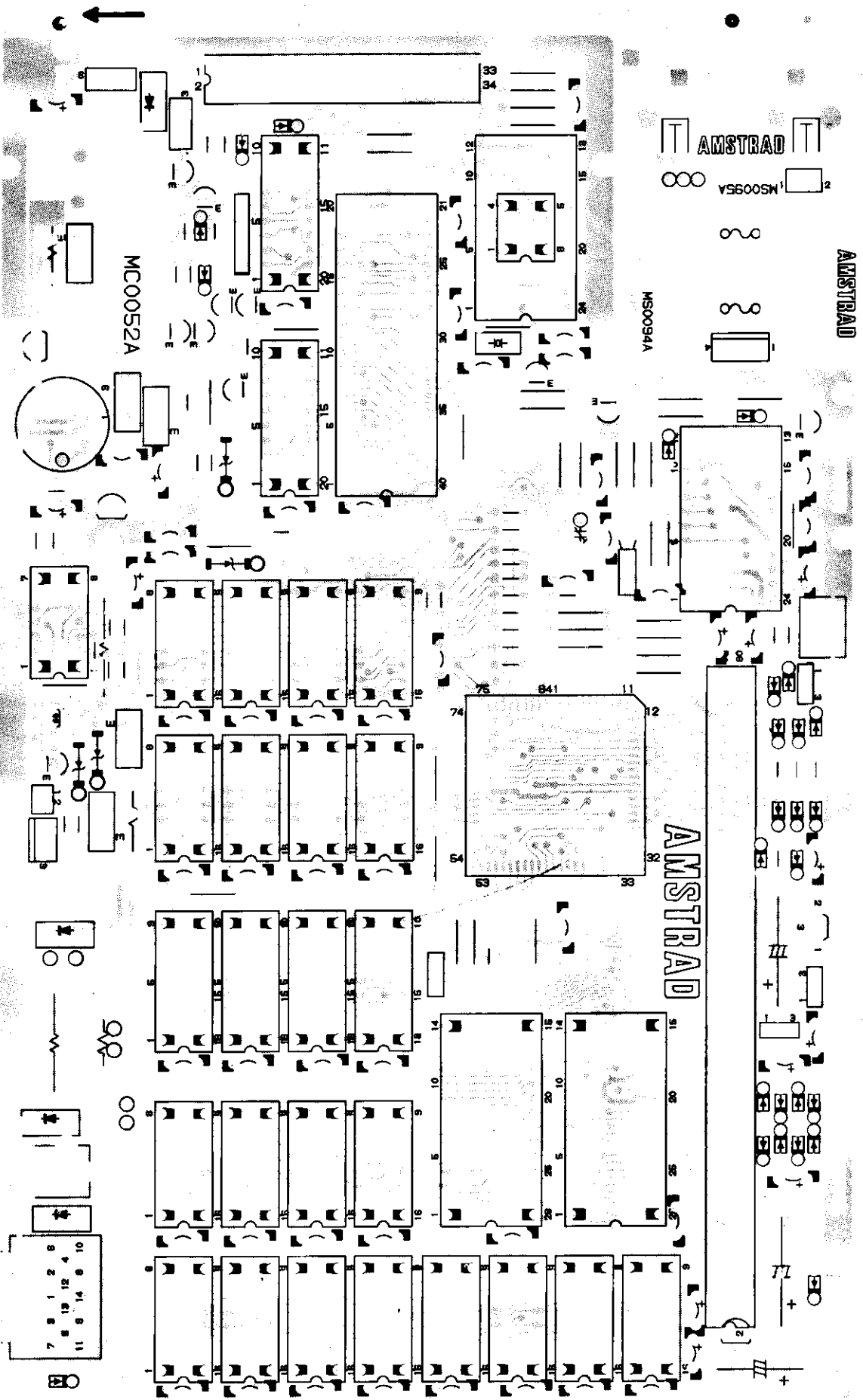




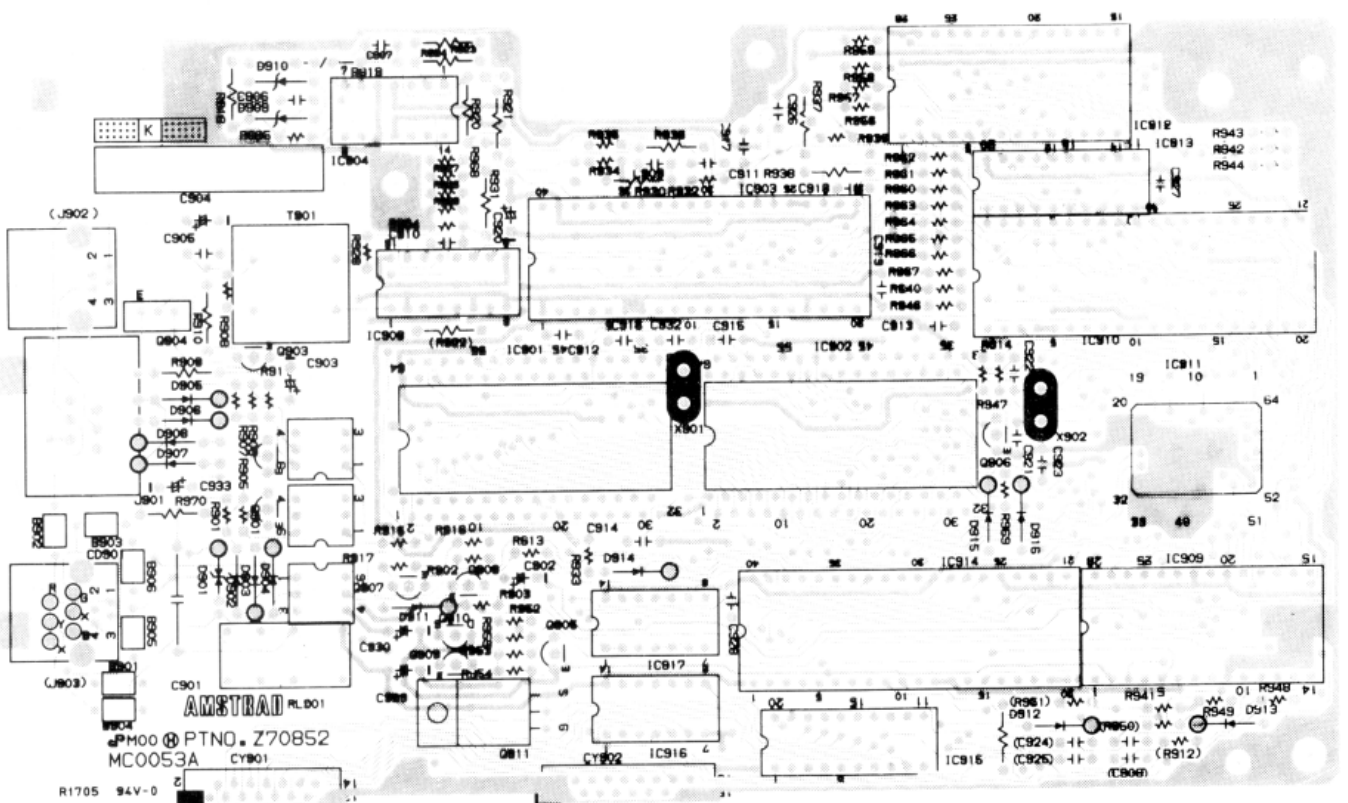
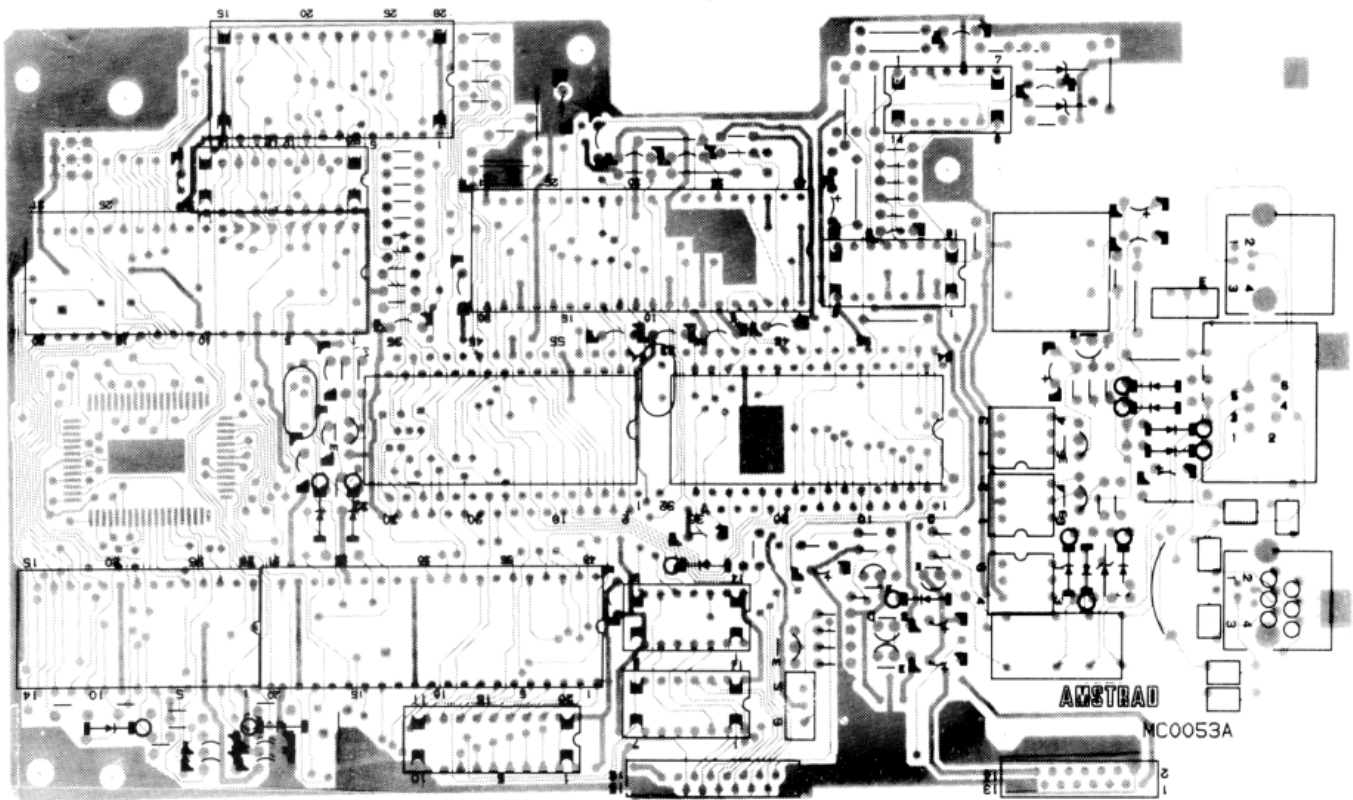
CPU/SWITCH/BATTERY P.C.B.s



MEMORY/FUSE/VOLUME P.C.B.



MODEM P.C.B. COMPONENT LAYOUT



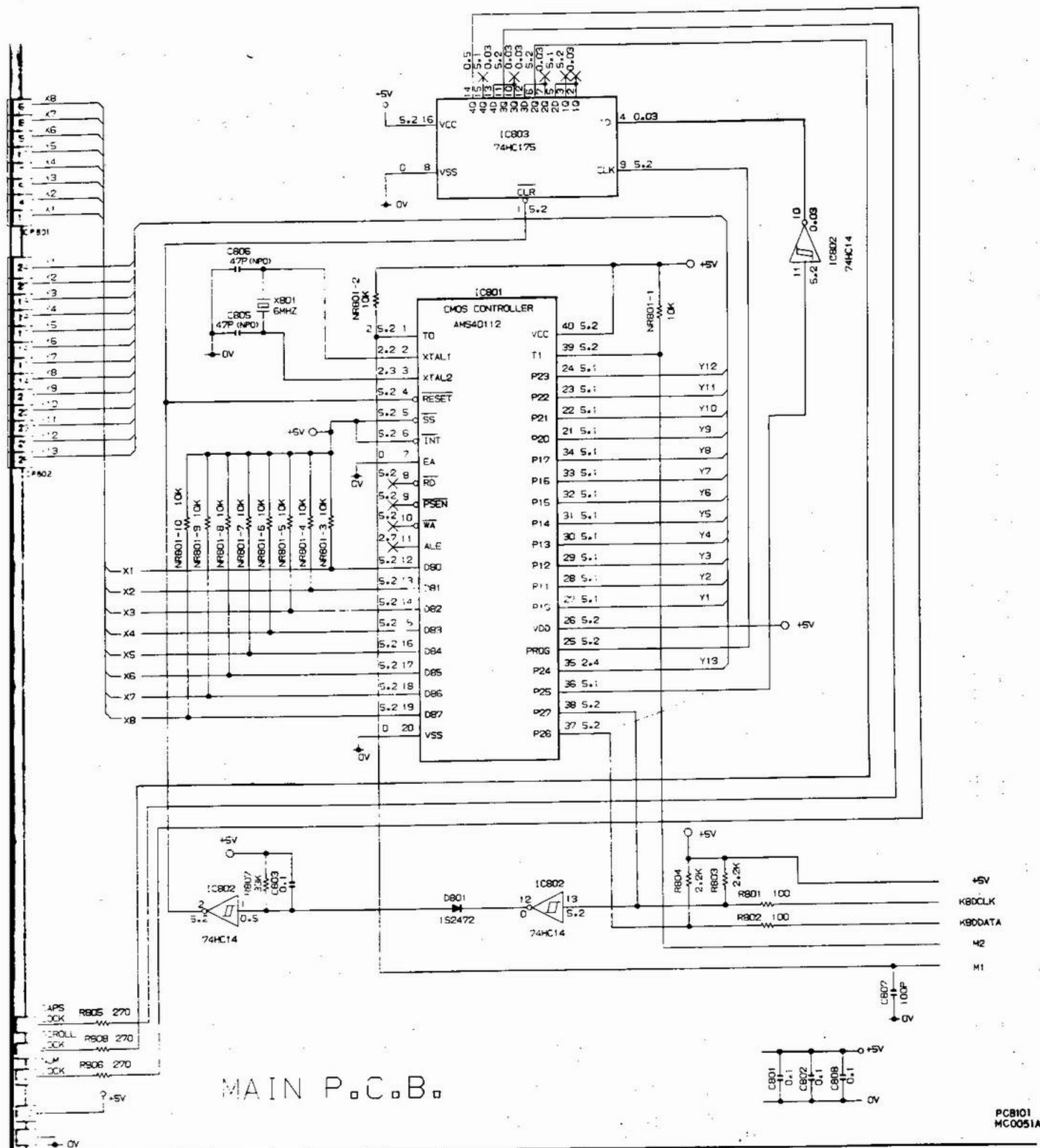
KEYBOARD SCHEMATIC DIAGRAM

| | X8 | X7 | X6 | X5 | X4 | X3 | X2 | X1 | |
|-----|--------------|---------------|--------------|---------|------|--------------|-------------|----------|-----|
| Y1 | (LEFT) CTRL | (LEFT) SHIFT | CAPS LOCK | 1 | 2 | F1 | ESC | | Y1 |
| Y2 | (**1) Z | A | Q | W | 3 | F2 | | | Y2 |
| Y3 | S | X | D | ALT | E | F4 | F3 | | Y3 |
| Y4 | V | C | G | F | T | R | % | F5 | Y4 |
| Y5 | N | B | H | U | Y | & | ^ | F6 | Y5 |
| Y6 | SPACE | < | M | J | K | I | * | F7 | Y6 |
| Y7 | > | : | L | P | O |) | (| F8 | Y7 |
| Y8 | ALT GR | ? | @ | } | { | + | = | F9 | Y8 |
| Y9 | (RIGHT) CTRL | (RIGHT) SHIFT | (**1) RETURN | (**2) | F11 | F10 | | | Y9 |
| Y10 | (**3) ↓ | ↑ | DELETE | INSERT | ← | PRINT SCREEN | SYSTRQ | F12 | Y10 |
| Y11 | 0 | → | PAGE DOWN | PAGE UP | HOME | PAUSE BREAK | SCROLL LOCK | | Y11 |
| Y12 | 2 | 1 | 5 | 4 | 8 | 7 | / | NUM LOCK | Y12 |
| Y13 | DEL | ENTER | 3 | 6 | + | 9 | - | * | Y13 |
| | X8 | X7 | X6 | X5 | X4 | X3 | X2 | X1 | |

- **1 THESE TWO KEYS (X8.Y2) & (X5.Y9) PRESENT IN 102 KEY VERSION ONLY
 **2 THIS KEY (X3.Y9) PRESENT IN 101 KEY VERSION ONLY
 **3 THIS POSITION (X8.Y10) UNUSED IN BOTH 101 AND 102 KEY VERSIONS

KEYBOARD

SW801
ESU24LN573AA



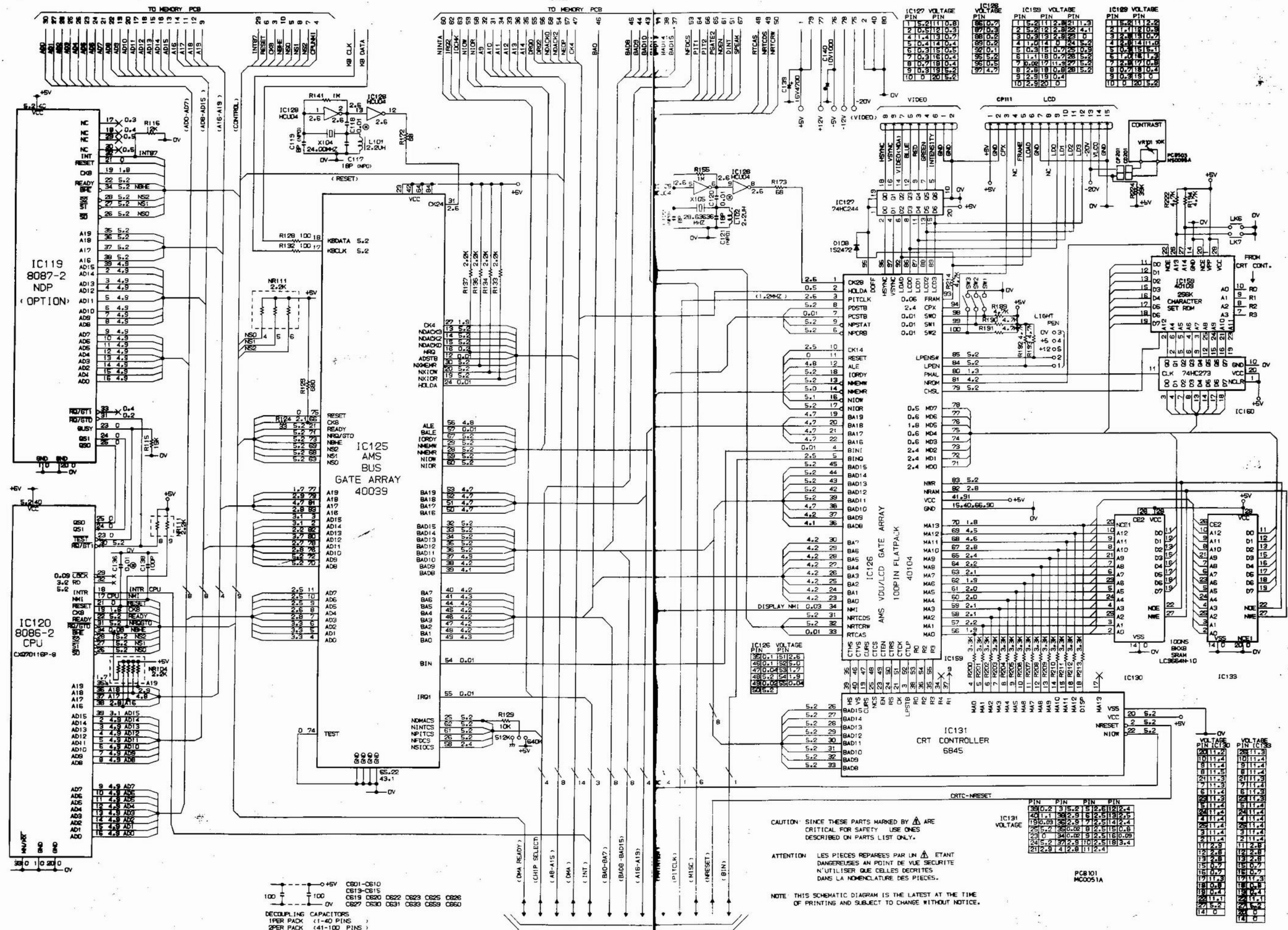
The schematic diagram illustrates the electrical connections between a Main PCB and a Main PC5. Key components and their connections include:

- Memory Arrays:** IC118 (AMS MEMORY GATE ARRAY 40040), IC135-143 (9x256K DRAM), IC144-152 (9x256K DRAM), IC153 (4x64K DRAM), IC154 (4x64K DRAM), IC156 (4x64K DRAM), IC157 (4x64K DRAM), IC132 (AMS ROM 40107 8x8 K), and IC129 (AMS ROM 40108 8x8 K).
- Floppy Disk Controller:** IC112 (UPD72065 TC8565 CMOS FLOPPY DISK CONTROLLER).
- Data Separator:** IC111 (SED9420CAC).
- Logic and Timing:** IC116 (74HC240), IC117 (74HC240), IC118 (74HC240), IC119 (74HC240), IC120 (74HC240), IC121 (74HC240), IC122 (74HC240), IC123 (74HC240), IC124 (74HC240), IC125 (74HC240), IC126 (74HC240), IC127 (74HC240), IC128 (74HC240), IC129 (74HC240), IC130 (74HC240), IC131 (74HC240), IC132 (74HC240), IC133 (74HC240), IC134 (74HC240), IC135 (74HC240), IC136 (74HC240), IC137 (74HC240), IC138 (74HC240), IC139 (74HC240), IC140 (74HC240), IC141 (74HC240), IC142 (74HC240), IC143 (74HC240), IC144 (74HC240), IC145 (74HC240), IC146 (74HC240), IC147 (74HC240), IC148 (74HC240), IC149 (74HC240), IC150 (74HC240), IC151 (74HC240), IC152 (74HC240), IC153 (74HC240), IC154 (74HC240), IC155 (74HC240), IC156 (74HC240), IC157 (74HC240), IC158 (74HC240), IC159 (74HC240), IC160 (74HC240), IC161 (74HC240), IC162 (74HC240), IC163 (74HC240), IC164 (74HC240), IC165 (74HC240), IC166 (74HC240), IC167 (74HC240), IC168 (74HC240), IC169 (74HC240), IC170 (74HC240), IC171 (74HC240), IC172 (74HC240), IC173 (74HC240), IC174 (74HC240), IC175 (74HC240), IC176 (74HC240), IC177 (74HC240), IC178 (74HC240), IC179 (74HC240), IC180 (74HC240), IC181 (74HC240), IC182 (74HC240), IC183 (74HC240), IC184 (74HC240), IC185 (74HC240), IC186 (74HC240), IC187 (74HC240), IC188 (74HC240), IC189 (74HC240), IC190 (74HC240), IC191 (74HC240), IC192 (74HC240), IC193 (74HC240), IC194 (74HC240), IC195 (74HC240), IC196 (74HC240), IC197 (74HC240), IC198 (74HC240), IC199 (74HC240), IC200 (74HC240).
- Power and Ground:** Connections for +5V, GND, and various power planes.
- Signal Lines:** Data, Address, and Control lines connecting the Main PCB and Main PC5.
- Other Components:** Resistors (R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100), capacitors (C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25, C26, C27, C28, C29, C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42, C43, C44, C45, C46, C47, C48, C49, C50, C51, C52, C53, C54, C55, C56, C57, C58, C59, C60, C61, C62, C63, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93, C94, C95, C96, C97, C98, C99, C100), and other passive components.

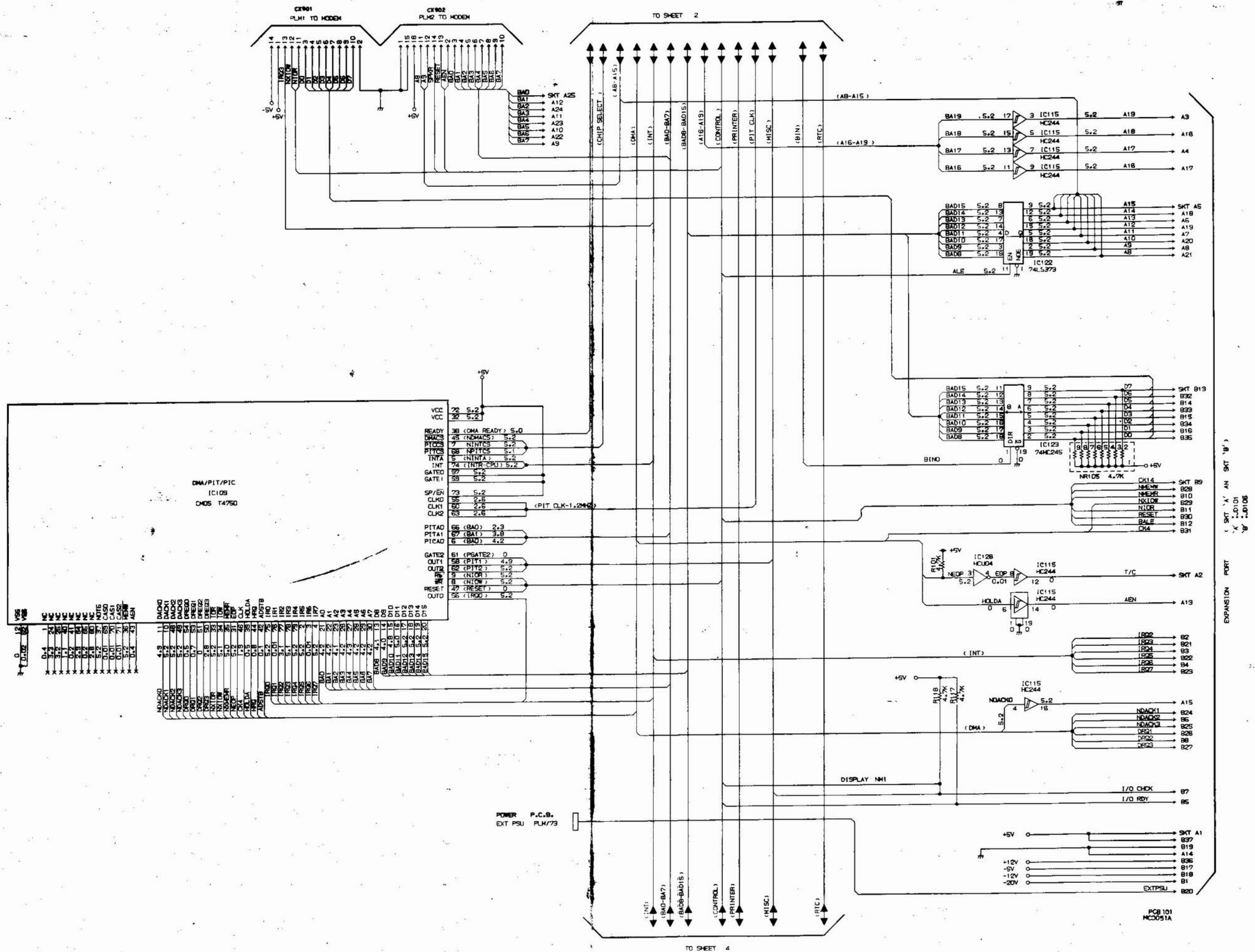
Labels at the bottom of the diagram include: MAIN PCB, MAIN PC5, FDD CD102, PCB501 MC0052A, and ALTERNATIVE DATA SEPARATOR CIRCUITS USE ONLY ONE.

CHASSIS SCHEMATIC DIAGRAM

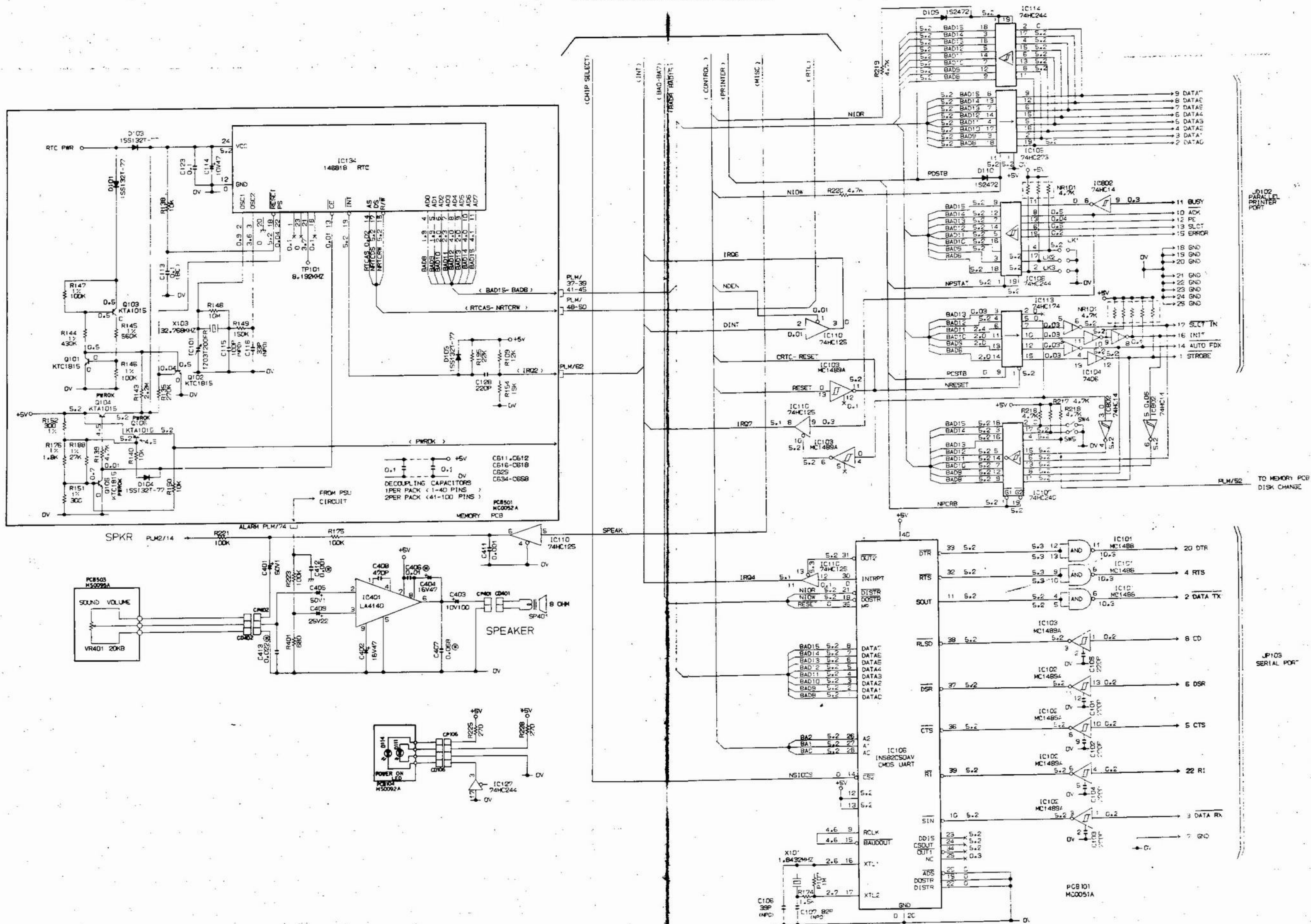
CY903



CHASSIS SCHEMATIC DIAGRAM

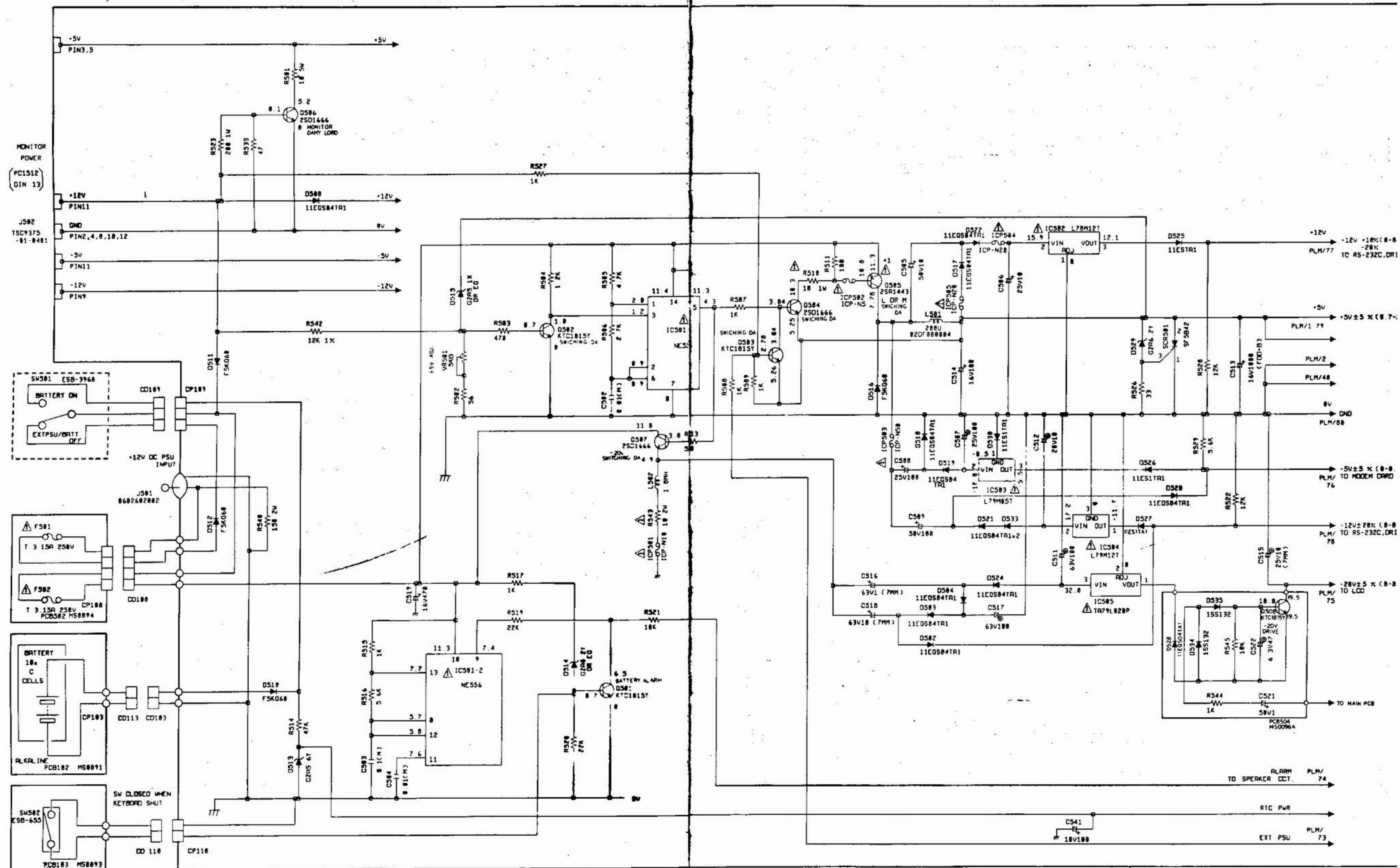


CHASSIS SCHEMATIC DIAGRAM




NOTE THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE

POWER SUPPLY SCHEMATIC DIAGRAM



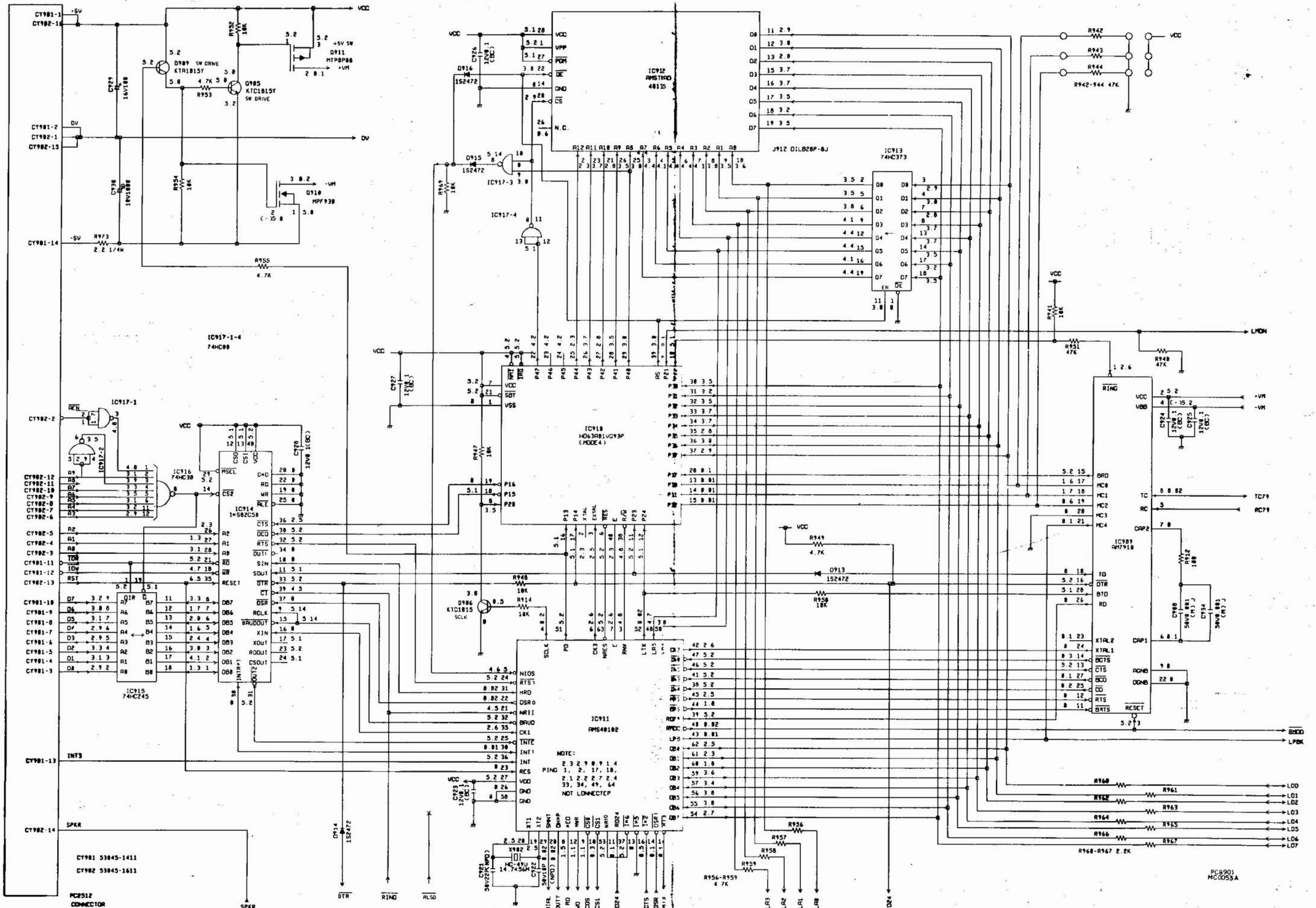
NOTE FSK060 IS 5A SCHOTTKY
110004 IS 1A SCHOTTKY
H
11E0504TR1 (TAPING)
*1 0505 258025 = 25R1443 (FULL PACK)

CAUTION: SINCE THESE PARTS MARKED BY  ARE CRITICAL FOR SAFETY, USE ONES DESCRIBED IN PARTS LIST ONLY.

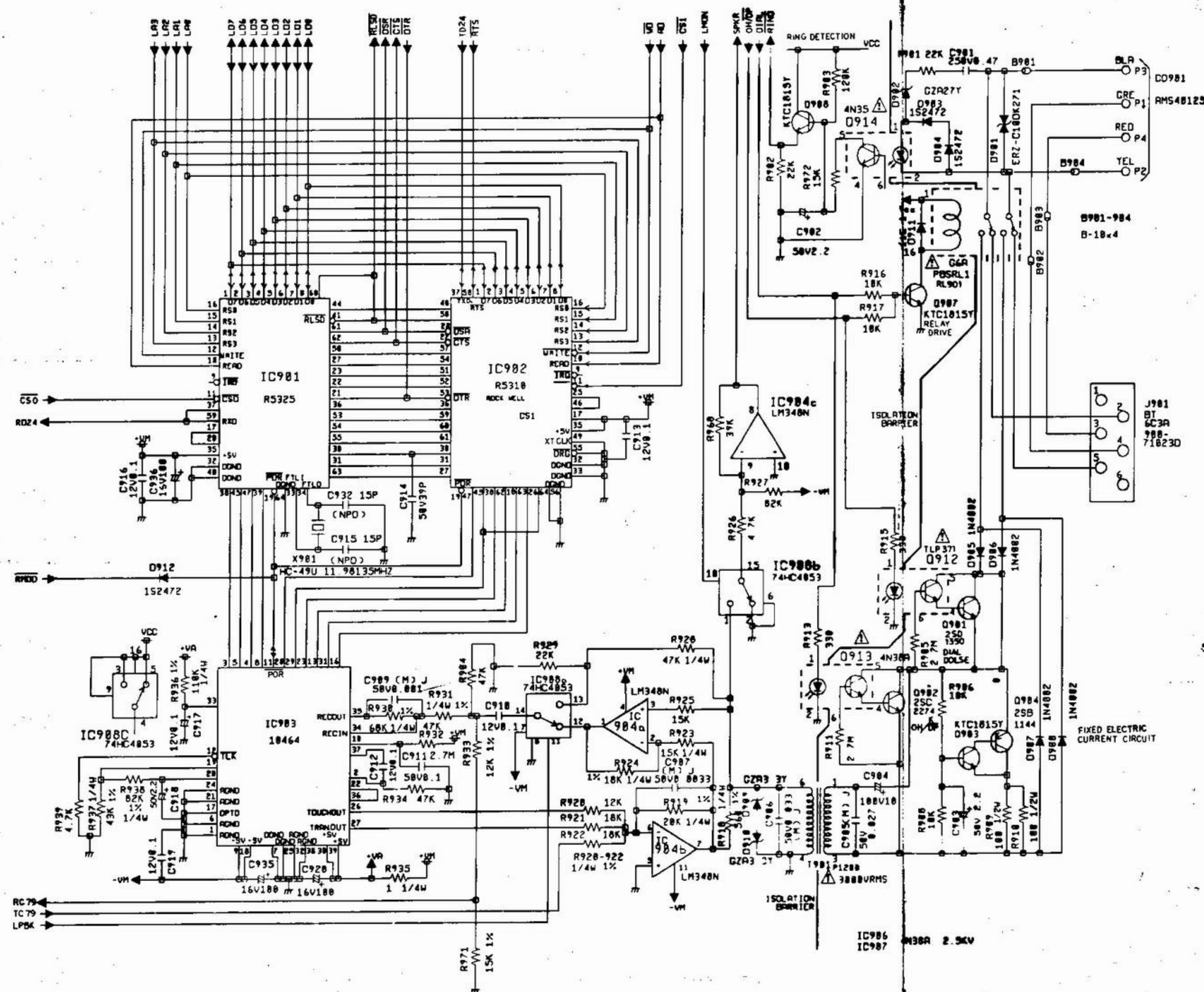
ATTENTION: LES PIECES REPARÉES PAR UN ÉTANT DANGEREUSES AU POINT DE VUE SÉCURITÉ N'UTILISER QUE CELLES DÉCRITES DANS LA NOMENCLATURE DES PIÈCES

NOTE: THIS SCHEMATIC DIAGRAM IS THE LATEST AT THE TIME OF PRINTING AND SUBJECT TO CHANGE WITHOUT NOTICE.

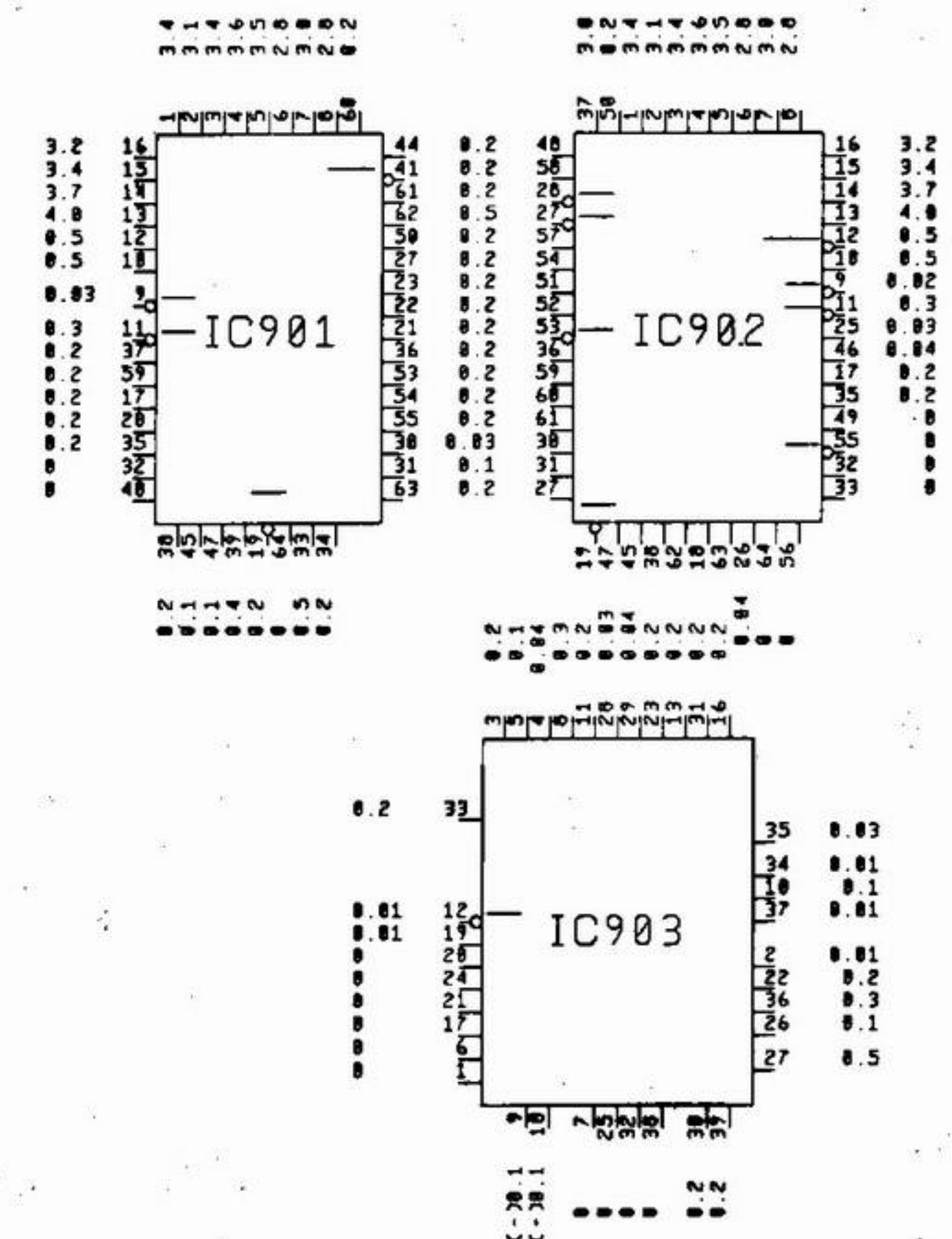
MODEM CHASSIS SCHEMATIC DIAGRAM



MODEM CHASSIS SCHEMATIC DIAGRAM (2)



PIN OUT CONFIGURATION OF MODEM I.C.s



| | | |
|---------------|-------------|---------|
| Q912 | Q901 | Q904 |
| 1 2 4 5 6 | E C B | E C B |
| 0 0 0.2 0 0.1 | 0 0.02 0.03 | 0 0 0.1 |

| | | |
|---------------|----------|---------|
| Q913 | Q902 | Q907 |
| 1 4 5 6 | E C B | E C B |
| 0 0 0.2 0 0.1 | 0 0 0.01 | 0 5.2 0 |

| | | |
|-------------------|---------|-------------|
| Q914 | Q903 | Q908 |
| 1 2 4 5 6 | E C B | E C B |
| 0.2 0.1 0 4.0 0.5 | 0 0.1 0 | 4.4 5.2 5.0 |

| | |
|-----------|--------------------|
| IC904a | IC908a |
| 1 2 3 4 | 7 8 11 12 13 14 |
| 0 0 0 0.2 | (-0.1) 0 0.4 0 0 0 |

| | |
|-----------------|-------------|
| IC904b | IC908b |
| 5 6 7 11 | 1 2 6 10 15 |
| 0 0.09 0 (-0.1) | 0 0 0 5.1 0 |

| | |
|--------------|---------------------|
| IC904c | IC908c |
| 0 9 10 | 3 4 5 9 16 |
| 0.9 (-0.1) 0 | 5.2 5.2 5.2 5.2 5.2 |

ELECTRICAL PARTS LIST

| Description | Circuit Reference | Part No. |
|--|---|----------|
| Resistors | | |
| (All resistors are 1/4W unless otherwise stated) | | |
| 1Ω 1/6W | R935 | 152138 |
| 2.2Ω | R973 | 177338 |
| 33Ω | R124, 156-169, 526 | 10018 |
| 47Ω 1/6W | R533 | 152160 |
| 56Ω | R229, 502 | 10024 |
| 68Ω | R172, 173 | 10028 |
| 100Ω 1/6W | R912 | 152215 |
| 100Ω | R120-123, 128, 132, 511, 801, 802 | 10032 |
| 100Ω ½W | R909, 910 | 177339 |
| 270Ω | R225-228, 805, 806, 808 | 10042 |
| 330Ω | R913, 915 | 152172 |
| 470Ω | R503 | 152174 |
| 560Ω | R513 | 10050 |
| 680Ω | R125 | 10052 |
| 1kΩ | R507-509, 515, 517, 527, 544 | 152179 |
| 1.2kΩ | R504 | 10063 |
| 1.5kΩ | R106, 174 | 10065 |
| 2.2kΩ | R102, 133, 134, 136, 137, 230, 803, 804 | 10069 |
| 2.2kΩ 1/6W | R231, 960-967 | 152183 |
| 2.7kΩ 1/6W | R506 | 152184 |
| 3.3kΩ | R200-213 | 10073 |
| 4.7kΩ 1/6W | R139, 505, 926, 939, 949, 953, 955-959 | 152188 |
| 4.7kΩ | R101, 108, 117, 118, 189-194, 214, 216-220, 222 | 10077 |
| 5.6kΩ 1/6W | R516, 529 | 152189 |
| 6.8kΩ | R105 | 10081 |
| 10kΩ 1/6W | R140, 177, 521, 545, 906, 908, 914, 916, 917, 941, 947, 948, 950, 952, 954, 969 | 152194 |
| 10kΩ | R129, 138, 150, 170, 171, 178-180 | 10085 |
| 12kΩ | R103, 109, 116 | 10087 |
| 12kΩ 1/6W | R522, 528 | 152195 |
| 15kΩ | R115, 154 | 10089 |
| 15kΩ 1/6W | R925, 972 | 152196 |
| 22kΩ | R195 | 10093 |
| 22kΩ 1/6W | R519, 520, 901, 902, 929 | 152189 |
| 33kΩ | R104, 807 | 10097 |
| 39kΩ | R968 | 152201 |
| 39kΩ | R224 | 10099 |
| 47kΩ | R514, 904, 928, 934, 940, 942-944, 951 | 152203 |
| 82kΩ | R927 | 152207 |
| 100kΩ | R175, 221, 223 | 10109 |
| 120kΩ | R903 | 152210 |
| 150kΩ | R149 | 152211 |
| 270kΩ | R135 | 152214 |
| 1MΩ | R107, 119, 141, 155 | 10147 |
| 2.2MΩ | R143 | 152227 |
| 2.7MΩ | R905, 911, 932 | 152228 |
| 10MΩ | R148 | 152132 |

| | | |
|--|----------------|--------|
| Metal Film Resistors | | |
| (All resistors are 1/4W unless otherwise stated) | | |
| 300Ω | R151, 152 | 177344 |
| 560Ω | R918 | 177345 |
| 1.8kΩ | R176 | 177346 |
| 12kΩ | R542, 920, 933 | 177347 |
| 15kΩ | R923, 971 | 177348 |
| 18kΩ | R921, 922, 924 | 177349 |
| 20kΩ | R919 | 177350 |
| 27kΩ | R188 | 177351 |
| 43kΩ | R937 | 177352 |
| 47kΩ | R931 | 177353 |
| 68kΩ | R930 | 177354 |
| 82kΩ | R938 | 177355 |
| 100kΩ 1/6W | R146, 147 | 177356 |
| 110kΩ | R936 | 177357 |
| 430kΩ 1/6W | R144 | 177358 |
| 560kΩ 1/6W | R145 | 177359 |

| Description | Circ. Ref. | Part No. |
|------------------------------|------------|----------|
| Metal Oxide Resistors | | |
| 10Ω 1W | R510 | 177360 |
| 10Ω 2W | R543 | 177361 |
| 150Ω 2W | R540 | 177362 |
| 220Ω 1W | R523 | 177363 |

| | | |
|-------------------------|------|--------|
| Cement Resistors | | |
| 10Ω 5W | R501 | 177340 |

| | | |
|---------------------------|----------------|--------|
| Variable Resistors | | |
| VR101 | VR Rotary 10kΩ | 177341 |
| VR401 | VR Rotary 20kΩ | 177342 |
| VR501 | VR SF 5kΩ | 177343 |

| | | |
|---------------------------|---|--------|
| Ceramic Capacitors | | |
| 7pF NPO | C111, 112 | 177364 |
| 8pF NPO | C119, 122 | 177365 |
| 10pF NPO | C922 | 177366 |
| 15pF NPO | C915, 932 | 177367 |
| 18pF NPO | C117, 121 | 177368 |
| 22pF NPO | C921 | 177369 |
| 33pF NPO | C116 | 177370 |
| 39pF NPO | C106, 914 | 150508 |
| 47pF NPO | C805, 806 | 175128 |
| 82pF NPO | C107 | 150507 |
| 100pF NPO | C115 | 177373 |
| 100pF | C138, 807 | 24016 |
| 220pF | C101-105, 128 | 400107 |
| 470pF | C135, 408 | 150496 |
| 0.001uF | C411 | 150518 |
| 0.1uF | C113, 123, 129, 132, 601-620, 622, 623, 625-627, 630, 631, 633-661, 801-803, 808, 910-913, 916, 917, 919, 923-928 | 20062 |

| | | |
|--------------------------------|--------------------------|---------|
| Electrolytic Capacitors | | |
| 1uF/50V | C401, 405, 521 | 20062 |
| 1uF/63V | C516 | 177374 |
| 2.2uF/50V | C902, 903, 918 | 151598 |
| 10uF/25V | C506, 515 | 171601 |
| 10uF/50V | C505, 512 | 177375 |
| 10uF/63V | C518 | 177376 |
| 10uF/100V | C904 | 177377 |
| 22uF/25V | C409 | 177378 |
| 47uF/16V | C114, 402, 404, 522 | 20027 |
| 100uF/16V | C541, 920, 929, 935, 936 | 20028 |
| 100uF/25V | C507, 508 | 177379 |
| 100uF/50V | C509 | 177380 |
| 100uF/63V | C511, 517 | 177381 |
| 470uF/16V | C519 | 1422248 |
| 1000uF/10V | C140, 403, 930 | 171605 |
| 1000uF/16V | C513, 514 | 1400345 |
| 4700uF/16V | C139 | 170613 |

| | | |
|---|------------------------------------|--------|
| Polyester Capacitors | | |
| (Working voltage of all Capacitors is 50V DC) | | |
| 0.001uF | C110, 412, 908, 909, 934 | 171093 |
| 0.0033uF | C907 | 151600 |
| 0.01uF | C108, 118, 120, 136, 406, 502, 504 | 171236 |
| 0.022uF | C413 | 177382 |
| 0.027uF | C905 | 177153 |
| 0.033uF | C906 | 177383 |
| 0.047uF | C109 | 170422 |
| 0.068uF | C407 | 177384 |
| 0.1uF | C503 | 177155 |

| | | |
|----------------------------------|------|--------|
| Metal Polyester Capacitor | | |
| 0.47uF/250V | C901 | 177385 |

ELECTRICAL PARTS LIST

| Circ. Ref. | Description | Part No. |
|---------------------------------------|--------------------------|----------|
| Diodes | | |
| D101-110 | D 1SS132T-77 | 171552 |
| D111 | LED SLP-155B | 170866 |
| D112, 113 | LED SLP-251B | 177270 |
| D114 | LED SLP-451B | 177271 |
| D502-504, 508, 517-522, 524, 528, 533 | D Shottky 11EQS04TA1 | 177272 |
| D510-512, 516 | D Shottky Barrier F5KQ60 | 171496 |
| D513 | DZ GZA5.6Y BT | 171499 |
| D514 | DZ GZA8.2Y BT | 177274 |
| D515 | DZ GZA5.1X BT | 1422112 |
| D525-527, 530 | D 11ES1TA1 | 171551 |
| D529 | DZ GZA6.2Y BT | 177275 |
| D534, 535, 801 | D 1S2472T-77 | 175050 |
| IC's | | |
| IC101 | IC MC1488P | 171378 |
| IC102, 103 | IC MC1489 | 171379 |
| IC104 | IC HD7406P | 171380 |
| IC105, 160 | IC SN74HC273N | 177277 |
| IC106, 914 | IC INS82C50 | 171381 |
| IC107 | IC LC74HC240 | 177278 |
| IC108, 114, 115, 127 | IC LC74HC244 | 177279 |
| IC109 | IC T4750 | 40111 |
| IC110 | IC LC74HC125 | 177281 |
| IC111 | IC SED9420CAC | 171034 |
| IC112 | IC TC8565P | 177282 |
| IC113 | IC LC74HC174 | 177283 |
| IC116, 117 | IC TC74HC240P | 177278 |
| IC118 | IC AMS40040 | 171391 |
| IC120 | IC CXQ70116P-8 | 177284 |
| IC122 | IC SN74LS373N | 170108 |
| IC123, 915 | IC LC74HC245 | 177285 |
| IC125 | IC HSG5140/AMS40039 | 171577 |
| IC126 | IC AMS40104 | 40104 |
| IC128 | IC LC74HCU04 | 40008/A |
| IC129 | IC AMS40108 | 40108 |
| IC130, 133 | IC LC3664-10 | 177286 |
| IC131 | IC UM6845/AMS40072 | 170106 |
| IC132 | IC AMS40107 | 40107 |
| IC134 | IC MC146818P | 171399 |
| IC135-152 | IC KM41256-15 | 171400 |
| IC153-158 | IC KM4164B-15 | 175005 |
| IC159 | IC AMS40109 | 40109 |
| IC401 | IC LA4140 | 170111 |
| IC501 | IC NE556CN | 177288 |
| IC502 | IC L78M12T | 190062 |
| IC503 | IC L79M05T | 177289 |
| LC504 | IC L79M12T | 177290 |
| IC505 | IC TA79L020P | 177291 |
| IC801 | IC AMS40112 | 40112 |
| IC802 | IC LC74HC14 | 171033 |
| IC803 | IC LC74HC175 | 177292 |
| IC901 | IC R5325 | 177293 |
| IC902 | IC R5310 | 177294 |
| IC903 | IC 10464 | 177295 |
| IC904 | IC LM348N | 177296 |
| IC908 | IC TC74HC4053AP | 177297 |
| IC909 | IC AM791P | 177298 |
| IC910 | IC HD63A01V1G93P | 177299 |
| IC911 | IC AMSTRAD 40102 | 40102 |
| IC912 | IC AMSTRAD 40135 | 40135 |
| IC913 | IC LC74HC373 | 177300 |
| IC916 | IC LC74HC30 | 177302 |
| IC917 | IC LC74HC00 | 177303 |

ELECTRICAL PARTS LIST

| Circ. Ref. | Description | Part No. |
|--|-------------------------------------|----------|
| Transistors | | |
| Q101, 102, 105, 501-503, 508, 903, 905-909 | TR KTC1815Y | 170447 |
| Q103, 104, 106-108 | TR KTA1015Y | 170453 |
| Q504, 506, 507 | TR 2SD1666R | 177304 |
| Q505 | TR 2SA1443L | 177305 |
| Q901 | TR 2SD1350 | 177306 |
| Q902 | TR 2SC2274 | 150566 |
| Q904 | TR 2SB1144 | 177307 |
| Q910 | TR Field Effect MPF930 | 177308 |
| Q911 | TR Field Effect MTP8P08 | 177309 |
| Q912 | TR Photo Coupler TLP371 | 177310 |
| Q913 | TR Photo Coupler 4N38A | 177311 |
| Q914 | TR Photo Coupler 4N35 | 177312 |
| Coils | | |
| L101, 102 | Coil 2.2uH | 175024 |
| L501 | Coil 200uH | 150949 |
| L502 | Coil 1.8uH | 162652 |
| T901 | Line Transformer P-1200 | 177313 |
| Jacks | | |
| J501 | Jack DC | 170834 |
| J502 | Jack DIN | 171437 |
| J901 | Socket Telephone 900-71023D | 177314 |
| Switches | | |
| SW101 | Slide Switch A6DR-6100 | 177315 |
| SW501 | Slide Switch Power On/Off | 177316 |
| SW502 | Push Switch Sensor | 177317 |
| SW801 | Switch Key Board PPC512 | 177318 |
| | Switch Key Board PPC640 | 177319 |
| PCB's | | |
| PCB101 | PCB CPU MC0051A | 177259 |
| PCB102 | PCB Switch Micro | 177320 |
| PCB103 | PCB Switch | 177255 |
| PCB104 | PCB LED | 177249 |
| PCB501 | PCB Memory and Power Supply MC0057A | 177252 |
| PCB502 | PCB Fuse | 177251 |
| PCB503 | PCB Volume Control | 177253 |
| PCB504 | PCB Control | 177321 |
| PCB901 | PCB Modem MC0053A | 177322 |

ELECTRICAL PARTS LIST

| Circ. Ref. | Description | Part No. |
|----------------------|------------------------------------|----------|
| Miscellaneous | | |
| AD501 | AC Adaptor | 177323 |
| | Cigarette Lighter Cable | 177324 |
| | Modem Extension Cable | 177325 |
| FDD201 | Floppy Disc Drive PPC512 | 177247 |
| | Floppy Disc Drive PPC640 | 177248 |
| ICP501 | ICP-N10 | 177326 |
| ICP502 | ICP-N5 | 177327 |
| ICP503 | ICP-N50 | 171547 |
| ICP504, 505 | ICP-N20 | 150442 |
| JD101 | Socket D-Sub 37 Way Expansion A | 177386 |
| JD102 | Socket D-Sub P. Printer | 171433 |
| JD105 | Socket D-Sub Video | 175131 |
| JD106 | Socket D-Sub 25 Way Expansion A | 177387 |
| JP103 | Socket D-Sub S. Printer | 171438 |
| LCD101 | LCD Super Twist Display | 177245 |
| NR101, 105 | Resistor Network 4.7k Ω x 8 | 171670 |
| NR102 | Resistor Network 1k Ω x 4 | 177328 |
| NR104, 111 | Resistor Network 2.2k Ω x 8 | 177329 |
| NR801 | Resistor Network 1k Ω x 8 | 171058 |
| SP101 | Speaker | 171370 |
| SCR501 | Thyristor SF5B42 | 177331 |
| TC101 | Trimmer Capacitor 200pF | 171371 |
| X101 | Crystal HC49U.843M | 171372 |
| X102 | Ceramic Oscillator CSA16.00MX7 | 177332 |
| X103 | Crystal DSVT30032K | 171374 |
| X104 | Crystal HC49U24M | 177333 |
| X105 | Crystal HC49U28.63636M | 177334 |
| X801 | Ceramic Oscillator KBR6.00MM | 171377 |
| X901 | Crystal HC-49/U 11981.35 | 177335 |
| X902 | Crystal HC-49/U 14745.6k | 177336 |
| RL901 | Relay G6A-234P-BS | 177337 |
| | Carry Case | 177388 |
| | MSDOS System Disc 3.3 | 48001 |
| | Mirror Soft Disc | 48003 |

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